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Argonne National Laboratory

ARGONNE CODE CENTER: COMPILATION OF PROGRAM ABSTRACTS

by

M. K. Butler, M. DeBruler, H. S. Edwards,
C. Harrison, Jr., Catherine E. Hughes,
Marianne Legan, T. Menozzi,
L. Ranzini, and Anthony J. Strecok

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Supplemental and replacement pages contained in this publication are as follows:

PAGES TO BE INSERTED	PAGES TO BE REMOVED	COMMENT
1-10	1-10	Revised pages
55-58	55-58	ACC Abstract 50 revised
76.1-76.2	76.1-76.2	ACC Abstract R80 revised
139-140	139-140	ACC Abstract 146 revised
377-378.2	377-378.2	ACC Abstract 262 revised
405-406.2	405-406.2	ACC Abstract R275 revised
455-458	455-458	ACC Abstract R299 revised
477-480	477-480	ACC Abstract 310 revised
543-546	543-546	ACC Abstract 341 revised
579-581.1, 581.2-582	579-582	ACC Abstract 358 revised
599-603.1	599-603.1	ACC Abstracts 368 and 369 revised
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649-652	649-652	ACC Abstract 392 revised
673-674	673-674	ACC Abstract R403 revised
735-742	735-742	ACC Abstracts 433 and 435 revised
765-771.1	765-771.1	ACC Abstracts R448 and 450 revised
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1133-1446	1133-1349	ACC Abstracts 611 through 646 added; Section VI Library Programs by Classification revised; Section VII KWIC Index revised; References replaced

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203	COMBCO, COMBINED B-W MULTI-LEVEL CONVOLUTION	PPCC	7040	F+MAP	RS P	A	258
204	AGN-GAM, FAST SPECTRUM MULTI-GP CONSTANT CALC	AGC	7090	F+FAP	RSBPLX T	B	260
205	BLOOSTS, POINT-KINETICS WITH 2-D HEAT TRANSFER	GGA	7044	F+MAP	RS P T	H	262
206	UNPACK, RETRIEVAL FROM SCISRS X-SECTION TAPE	GGA	7044	F+MAP	RSBP	M	264
207	CROSSPLOT, SC4C20 PLOTS FROM X-SECTION TAPES	GGA	7044	F+SPS	RSBP T	N	266
208	TRIX1, RESONANCE INTEGRAL X-SECTION CALC	AI	7094	F+MAP	RS PLX T	A	268
209	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LER	7094	F4	RS P T	C	270
209	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LASL	6600	F4	RS P T	C	270
209	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	BC	625	F+MAP	RS P T	C	270
209	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	ANL	360	F+BAL	RS P T	C	270
209	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LASL	7030	F4	RS P T	C	270
210	DTX, EFFECTIVE X-SECTION CALC FROM DSN OUTPUT	PW	1604	LAG1	RS P	N	273
211	MGDSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE	PW	1604	LAG1	RS P	C	275
212	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	UMCC	360	F4	RS P T	C	277
212	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	WANL	6600	F4	RS P T	C	277
213	RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG CELL	ANL	3600	F36	RSBP X T	B	279
214	MISH-MASH, RESONANCE INTEGRAL CALC HOMOGENEOUS	ANL	3600	F36	RSBP	A	281
215	CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST DATA	AI	7094	F+MAP	RS P	A	283
216	FSDP3, POINTWISE XSECS. FROM B-W PARAMETERS	GGA	1108	F5	RS P CT	A	285
217	LEGCOEF3, LEGENDRE COEF CALC FOR ANGULAR DIST	GGA	7044	F4	RS P X	A	287
218	GAVER, ENERGY INTERVAL X-SECTION AVERAGING	GGA	7044	F4	RS P	L	289
219	GAROL, RESONANCE OVERLAP AND LATTICE EFFECTS	GGA	7044	F+MAP	RS P T	B	291
219	GAROL, RESONANCE OVERLAP AND LATTICE EFFECTS	LER	7094	F+MAP	RS P T	B	291
220	GASP2, 1-D FEW-GP DIFFUSION POWER DIST SEARCH	GGA	7044	F4	RS P T	C	293
221	RELOAD-FEVER, 1-D FEW-GP DIFFUSION DEPLETION	GGA	7044	F4	RS P T	D	295
222	GAMBLE4, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY	GGA	7044	F+MAP	RSBP T	C	297
222	GAMBLE5, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY	GGA	1108	F+BAL	RS P T	C	297
223	REVISED-GAD, FUEL CYCLE ANALYSIS W/REFUELING	GGA	7044	F4	RS P T	D	299
224	WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY	GGA	7044	F4	RS P	D	301
224	WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY	UEC	6600	F4	RS P	D	301
225	TEMCO, 1-D FEW-GP DIFFUSION TEMP COEF CALC	GGA	7044	F4	RS P T	C	303
226	OPUS, POWER PLANT PERFORMANCE AND PRICE STUDY	GGA	7044	F+MAP	RS P T	D	305

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229	FLBOW, FUEL ELEMENT STRESS ANALYSIS STUDY	GGA	7044	F4	RS P T	G	311
231	RAD2, HTGR FISSION PRODUCT ACTIVITY DIST STUDY	GGA	7044	F4	RS P	D	315
232	GAZELLEE, GAS-COOLED CORE THERMAL DESIGN STUDY	GGA	7044	F4	RS P	I	317
233	CORE, CORE CONFIGURATION FUEL TEMPERATURE CODE	GGA	7044	F4	RS	I	319
234	DPC, DATA PREPARATION FOR 2-D DESIGN PROGRAMS	LASL	7090	F+FAP	RS P T	L	321
235	GAMMA-P, PRODUCTION X-SECTIONS FOR GAMMA-RAYS	GEC	7094	F4	RS P	B	323
236	DFSR, DATA FILE SERVICE ROUTINES ENDF TAPES	BNL	7090	F+FAP	RS P T	M	325
237	RCUNCE, FLUX DIST IN MULTI-PIN FUEL ELEMENT	AGC	7090	F2	RS P	B	327
238	FXT, X-SECTIONS FROM R-W RESONANCE PARAMETERS	WANL	7094	F2	RS P	A	329
239	CPS, SC4020 PLOTS FROM SCISRS X-SECTION TAPES	WANL	7094	F+FAP	RSRPL T	N	331
240	ASSAULT, 2-D MULTI-GP DIFFUSION DEPLETION CODE	ORNL	7090	F+FAP	RS P T	D	333
241	HFN, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	HNW	1107	F4	RS P T	C	336
242	RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS	LASL	7094	FAP	RS P T	H	338
242	RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS	LASL	7030	F4	RS T	H	338
243	AGN-SIGMA, CALC OF MULTI-GP TRANSFER MATRICES	AGC	7090	F2	RS P T	B	340
244	CYCLOPS1, THERMODYNAMIC CYCLE ANALYSIS	AI	7094	F2	RS PL T	I	342
246	FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW	AI	7094	F2	RS P	H	344
246	FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW	RSS	360	F4	RS P	H	344
247	FLANGE1, SCATTERING LAW X-SECTION CALCULATION	GGA	1108	F5	RS P	A	346
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249	LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE	TVA	360	F4	RSRPLXCT	B	350
250	SAFE-PCRS, STRESS ANALYSIS AXISYMMETRIC LOAD	GGA	7044	F4	RSRP CT	I	353
251	SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC LOAD	GGA	7044	F4	RS P T	I	355
252	SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES	BNL	6600	F4	RS P T	I	357
252	SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES	GGA	1108	F4	RS P	I	357
253	SAFE-SHELL, STRESS ANALYSIS THIN SHELLS	GGA	1108	F4	RS P	I	359
254	2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS	ANL	3600	F63	RSRP T	A	361
254	2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS	AI	7094	F2	RS P T	A	361
255	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	WANL	7094	F4	RS P	E	363
255	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	ANL	3600	F63	RSRP	E	363
255	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	ANL	360	F4	RS P	E	363
256	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS	WARD	6600	F4	RS P T	H	365
256	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS	NEC	635	F4	RS P T	H	365
257	REAX, RESOLVED RESONANCE EPITHERMAL X-SECTIONS	NEC	635	F4	RS P T	B	367
258	EXPN, ANALYSIS OF PULSED NEUTRON SOURCE DATA	NEC	635	F4	RS P T	O	369
259	MUSCAT, VIEW FACTOR SHIELDING CODE CAVITY GEOM	GGA	1108	F4	RS P T	J	371
260	GARGOYLE, FUEL CYCLE ANALYSIS PARTIAL REFUEL	GGA	7044	F4	RS P T	D	373
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262	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	ANL	3600	F36	RS P X T	C	377
262	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	MTS	360	F4	RSRPLXCT	C	377
262	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	PURD	6500	F4	RS PLX T	C	377
263	GASKET, THERMAL SCATTERING LAW CALCULATION	GGA	1108	F4	RS P	A	379
264	VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ RTH	WANL	7094	F4	RS P X T	C	381
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R266	CYGRO2, STRESS ANALYSIS CYL FUEL ELEMENT	BAPL	6600	F4	RS T	I	385
R267	WATER, STEAM TABLES 14.5-14,500PSIA 32-472DEGF	BAPL	6600	F4	RS T	H	387
268	TRANS-FUGUE1, TRANSIENT FLOW AND HEAT TRANSFER	AI	7094	F2	RS P T	G	389
269	DTF-BURN, 1-D MULTI-GP DTF4 WITH DEPLETION	LASL	7030	F4	RS P T	D	391
270	CAFSAR4,LIBLST, 1-D MULTI-GP DIFFUSION + LIB	AI	360	F4	RSRPLX T	C	393
271	CLIP, FORM OR THREDHS LIBRARY UTILITY ROUTINE	AI	360	F4	RSR L T	M	396
R272	FIGRO, LWBR FUEL SWELLING TEMPERATURE STUDY	BAPL	6600	F4	RS P T	H	398
273	THREDHS, 1-D FEW-GP DIFFUSION DESIGN SYSTEM	AI	360	F4	RSRP T	K	400
R274	WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	BAPL	6600	F4	RS P T	F	402
R274	WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	GGA	1108	F4	RS P T	F	402
R275	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	ANC	3600	F+BAL	RS P XCT	D	405
R275	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	BW	6600B	F+ASC	RS P T	D	405
R275	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	BAPL	6600C	F+ASC	RS P T	D	405
R275	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	BCS	6600D	F+ASC	P B T	D	405
R275	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	BAPL	6600A	F+ASC	RS P T	D	405
276	AVOID, ANNULAR VOID X-SECTION CALCULATION	GEC	625	F4	RS P	B	407
277	HAMMER,LITHE,HELP, CRITICAL ANALYSIS SYSTEM	CP	360	F+BAL	RS P XCT	B	409
278	WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS LOFT	UGA	360	F4	RS P	G	411
278	WHAM, LIQUID-FILLED PIPING SYSTEM ANALYSIS	KF	3600	F36	RSRP	G	411
279	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	JNC	1108	F5	RS LX T	B	413
279	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	WAPD	360	F4	RS PLXCT	B	413
279	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	AERI	6600		RSRPLX T	B	413
R280	MOBOT, 2-D DIFFUSION ABSORPTION REMOVAL X-SECS	BAPL	6600	F4	RS T	B	415
281	RABBLE,WLIB,FLAT, RESONANCE ABSORPTION, CELL	ANL	3600	F36	RSRP X T	B	417
R282	SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD	BAPL	6600	F4	RS P T	I	419
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R284	MO555,ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	6600	F4	RS P T	G	423
R285	RESO2,RESOO,DBF1, RESONANCE INTEGRAL HEX CELL	BAPL	6600	F+ASC	RS P X T	B	425
R286	HOT2, 2-D TRANSIENT HEAT CONDUCTION PROGRAM	BAPL	6600	F4	RS P T	H	427
287	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC	NEC	1108	F4	RS P T	C	429
287	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC	NEC	635	F4	RS PL T	C	429
288	SNARG-1D, 1-D MULTI-GP DISCRETE ORDINATE CALC	ANL	3600	F36	RS P T	C	432
289	GAKER, INELASTIC SCAT X-SECTION CALC MODERATOR	GGA	1108	F4	RS P	A	434
290	GASA, STABILITY ANALYSIS REACTOR KINETICS EQNS	GGA	1108	F4	RS P	E	436
291	HEXSCAT, ELASTIC SCAT X-SECTIONS HEX LATTICE	GGA	1108	F4	RS	B	438
292	PSEUDO, STATISTICAL RESONANCE PARAMETER CALC	ENEA	360	F4	RS P	A	440
292	PSEUDO, STATISTICAL RESONANCE PARAMETER CALC	GGA	1108	F4	RS P	A	440
293	MARS, 2-D EXCURSION CALCULATION R-Z GEOMETRY	APCA	7094	F4	RS P	F	442
R294	MO899,HOH, STEAM TABLES 14.5-2538 PSIA	ANL	1604	F63	RS P	H	444
R294	MO899,HOH, STEAM TABLES 14.5-2538 PSIA	BAPL	6600	F4	RS P T	H	444
R295	FLASH3, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	6600	F4	RS P T	G	446
296	GRDWRK, GRID GENERATION FOR SAFE PROGRAMS	GGA	1108	F4	RS P	L	448
298	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA	GGA	1108	F4	RS FLX T	B	452
298	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA	GGA	6600	F4	RS L T	B	452
R299	LION, 3-D TEMPERATURE DISTRIBUTION PROGRAM	CHI	1108	F4	RS P T	H	456
R299	LION4, 3-D TEMPERATURE DISTRIBUTION PROGRAM	KAPL	6600	F+ASC	RS P T	H	456
300	SAFE-CREEP, VISCOELASTIC ANALYSIS CONCRETE	GGA	1108	F4	RS P	I	458
301	FREVAP6, HTGR METALLIC FISSION PRODUCT RELEASE	GGA	1108	F4	RS P	D	460
302	GAFFE, EQUILIBRIUM FUEL CYCLE CALCULATION	GGA	1108	F4	S T	D	462
303	BLOOST6, COMBINED KINETICS 2-D HEAT TRANSFER	GGA	1108	F+BAL	RS P T	E	464
304	PERT4, 2-D PERTURBATION XY RZ RTHETA GEOMETRY	BNW	1108	F4	RS P	C	466
305	STRIP, RESOLVED RESONANCE INTEGRAL CALCULATION	BW	2000	F4	RS	A	468
306	FCC4, FUNDAMENTAL MODE FAST REACTOR X-SEC CALC	BNW	1108	F4	RS P T	B	470
307	HWOCR-SAFE, 2-D MONTE CARLO CELL CALCULATION	AI	360	F+BAL	RS P X T	B	472
308	JUPITOR1, COUPLED CHANNEL X-SEC EVALUATION	ENEA	360	F4	RS P CT	A	474
308	JUPITOR1, COUPLED-CHANNEL X-SEC EVALUATION	CRNL	1604	F63	RS P T	A	474
309	TSN, SPATIALLY-DEPENDENT REACTOR KINETICS	AI	7094	F+MAP	RS P T	F	476
309	TSN, SPATIALLY-DEPENDENT REACTOR KINETICS	AI	360	F4	RS P T	F	476
310	GAKIN2, 1D MULTIGROUP TIME-DEPENDENT DIFFUSION	MIT	370	F4	RS P T	F	478
311	BURNUP, HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS	NEC	635	F4	RS P T	D	480
312	TDSN, 2-D MULTIGROUP DISCRETE ORDINATE PROGRAM	LER	7090	F+MAP	RS P T	C	482
313	CINDER,MO102, POINT DEPLETION FISSION PRODUCT	CP	360	F+BAL	RS P T	D	484
313	CINDER,MO102, POINT DEPLETION FISSION PRODUCT	BAPL	6600	F4	RS P	D	484
314	NAP, NEUTRON-INDUCED GAMMA-RAY RADIOACTIVITY	IITR	7094	F4	RSBPLX T	D	486
315	WIREX, COMPUTER-PRODUCED WIRING LISTS UNTREX	LASL	7090	F+FAP	RS P	I	488
316	GAF,GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC	GGA	1108	F4	RS P X T	B	490
317	GAPOTKIN, SPACE-INDEPENDENT REACTOR KINETICS	GGA	1108	F4	RS P	E	493
318	FEVER7, 1-D MULTIGROUP DIFFUSION AND DEPLETION	GGA	1108	F4	RS P T	D	495
319	GASP7, 1-D BURNUP POWER DISTRIBUTION SEARCH	GGA	1108	F4	RS P T	C	497
320	TEMCO7, TEMPERATURE COEFFICIENT CALCULATION	GGA	1108	F4	RS P T	C	499
321	EXPALS, LEAST SQUARES EXPONENTIAL DECAY CURVES	LLL	7094	F2	RS P	P	501
322	ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC	CRNL	1604	F63	RS P	D	503
322	ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC	CRNL	360	F+BAL	RS P	D	503
323	MUFFLE, FISSILE NUCLIDE X-SECTION EVALUATION	CRNL	7090	F4	RSBP	A	505
324	FRANTIC, LEAST SQUARES FIT SUM OF EXPONENTIALS	MIT	7090	F2	RS P	P	507
325	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	ANL	3600	F4	RSBP T	D	509
325	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	BNW	1108	F4	RS P T	D	509
325	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	LASL	6600	F4	RS P T	D	509
326	AIROS2A, SIMULATION OF REACTOR DYNAMICS	AI	360	F+BAL	RS P T	E	511
R327	DAFT1, LEAST SQUARES FIT FISSILE NUCLIDE DATA	BAPL	6600	F4	RS P T	P	514
328	NURLOC-1.0, LOSS-OF-COOLANT THERMAL ANALYSIS	BCL	6400	F4	RS P T	G	516
R329	MO457,PIPE, ELASTIC STRESS OF PIPING SYSTEM	BAPL	6600	F4	RS P T	I	518
330	ECCSA4, LOSS-OF-COOLANT & EMERGENCY COOLING	BCL	6400	F4	RS P T	G	520
R331	FLOT1,MO219, PWR FLOW TRANSIENT ANALYSIS	BAPL	6600	F4	RS P T	H	522
332	SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY	CRNL	360	F+BAL	RS P T	I	524
332	SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY	GGA	1108	F4	RS P T	I	524
333	TOAD, PROCESSING OF ANALYZER GAMMA-RAY SPECTRA	GGA	1108	F+BAL	RS P T	D	526
334	PEGGY, ELASTIC SCATTERING PHASE-SHIFT ANALYSIS	CRNL	1604	F63	RS P	A	528
335	RAMES, PARTICLE WAVE FUNCTION RADIAL INTEGRALS	CRNL	1604	F63	RS P	A	530
R336	PDO5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	MIT	360R	F+BAL	RSBP T	D	531
R336	PDO5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	IBM	360A	F+BAL	RS P T	D	531
R337	STEM, MATRIX GENERATION FOR A SYSTEM OF BEAMS	KAPL	6600	F4	RS P	I	533
R338	TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK	BAPL	6600	F4	RS P T	F	535
R338	TWIGGLE, 2-D 2-GP SPACE-TIME DIFFUSION	ANL	360	F4	RS P	F	535
339	GAUGE, 2-D FEW-GP HEX GEOM DIFFUSION DEPLETION	GGA	1108	F4	RS P T	D	538
340	POWERCO, NUCLEAR STATION ELECTRICITY COSTS	CRNL	1604	F63	RS P	D	541
340	POWERCO, NUCLEAR STATION ELECTRICITY COSTS	UEC	6600	F4	RS P	D	541

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R342	MG648, 1-D SLAB TRANSPORT WITH SLOWING DOWN	BAPL	6600	F4	RS T	C	546
R343	MO756,LETC, 1-D SLAB GAMMA-RAY TRANSPORT	BAPL	6600	F4	RS P T	J	548
R344	GEM, EIGENVALUE PROBLEM FOR VIBRATING SYSTEMS	KAPL	6600	F+ASC	RS P T	I	550
345	GAND, GAFGAR X-SECTION LIBRARY PREPARATION	GGA	1108	F4	RS P X T	L	552
346	THTE, 3-D TRANSIENT HEAT TRANSFER PROGRAM	GEC	635	F+GMP	RSBP T	H	554
347	CODILLI, LEAST SQUARES ANALYSIS RESONANCE DATA	UILL	360	F4	RS P	A	556
R348	TOPS, TRANSIENT THERMODYNAMICS OF PRESSURIZERS	BAPL	6600	F4	RS P T	H	558
349	TCODEE, 2-D TIME-DEPENDENT HEAT CONDUCTION	PPCO	7044	F+MAP	RS P T	H	560
350	ETOE, ENDF/B TO MC**2 DATA CONVERSION	ANL	360	F4	RS P CT	M	562
350	ETOE, ENDF/B TO MC**2 DATA CONVERSION	APCA	3600	ASAF4	RS P T	M	562
351	ECSIL, EXPERIMENTAL NEUTRON DATA LIBRARY	LLL	7094	F+FAP	RS PL T	M	564
R352	RAUMZEIT, 1-D TIME-DEPENDENT DIFFUSION CALC	KAPL	6600	F4	RS P	F	567
353	SWELL2, FUEL ELEMENT LIFETIME ANALYSIS	ANL	3600	F36	RSBP	I	569
354	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	WAPD	6600	F4	RS P T	D	571
354	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	CWE	360	F4	RS P T	D	571
355	MC**2, ENDF MULTIGROUP X-SECTION CALCULATION	ANL	360	F4	RS P CT	B	573
355	MC**2, ENDF MULTIGROUP X-SECTION CALCULATION	ANL	3600	F36	RS P T	B	573
356	ZPR-III ASSEMBLY 48 GAFGAR ENDF/B DATA TAPES	GGA	1108	BIN	R L T	Z	575
357	SUPORAN, REACTOR CORE SUPPORT STRESS ANALYSIS	ANL	3600	F36	RS P T	I	578
358	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	3600	F4	RSBP CT	C	580
358	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	6600	F4	RS P T	C	580
358	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	7600	F4	RS P T	C	580
R359	PUN1, UNRESOLVED RESONANCE INTEGRALS X-SECS	PAPL	6600	F4	RS P T	A	582
360	TOR, THERMAL SCATTERING CRYSTALLINE MATERIALS	LASL	6600	F4	RS P T	A	584
361	GLEN, GROUP CONSTANT CALC FROM TOR OUTPUT DATA	LASL	6600	F4	RS P T	B	586
362	WELWING, MATERIAL BUCKLING CYL FUEL ELEMENTS	AEP	360	F4	RS P	B	588
363	BLAST, REACTOR KINETICS TEMPERATURE DIST STUDY	AFP	360	F4	RS P	E	590
R364	SNFQ, NONLINEAR ALGEBRAIC EQN SOLN CURVE PLOT	KAPL	6600	F+ASC	RS P T	P	592
365	BOW2, DEFLECTION CALCULATION PARALLEL BEAMS	ANL	3600	F36	SBP	I	594
366	CHEMLCC2, CORE HEATING CLADDING-STEAM REACTION	ANL	3600	F36	RSBP	G	596
367	ISOGEN, RADIONUCLIDE GENERATION AND DECAY	BNW	1108	F5	RSPPL T	D	598
368	FLANGF2(71-1), ENDF/B THERMAL SCATTERING DATA	OP	3608	F4	RS P XCT	A	600
369	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	6600	F4	RS P T	G	602
369	RELAP4, TRANSIENT THERMAL-HYDRAULIC ANALYSIS	ANC	3600	F+BAL	RSBPLXCT	G	602
369	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	360	F4	RSBP XCT	G	602
369	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	1108	F4	RS P T	G	602
370	GAKIT, 1-D MULTIGP KINETICS WITH TEMP FEEDBACK	GGA	1108	F4	RS P T	F	604
R371	NOWIG, 1-D 2-GP KINETICS TEMPERATURE FEEDBACK	BAPL	6600	F4	RS P T	F	607
372	RAPFU, FUEL CYCLE PARAMETERS FAST BREEDERS	NEP	635	F4	RS P	D	609
R373	BL47, DRAFTING TOOL TO PLOT PLANE STRUCTURES	BAPL	6600	F4	RS P T	L	611
374	1DX, 1-D DIFFUSION FAST X-SECTION GENERATION	BNW	1108	F4	RS P X T	B	613
375	SCORE3, SCISRS ENDF/B GRAPHIC X-SEC EVALUATION	AI	360	F+BAL	RSB L CT	M	615
376	AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC	BNL	6600	F4	RS P	A	617
376	AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC	BNL	7094	F4	RS P	A	617
377	SIGPLOT, RESOLVED MULTILEVEL B-W X-SEC CALC	BNL	6600	F4	RS P	A	619
R378	TUBE, U-TUBE HEAT EXCHANGER STRESS ANALYSIS	KAPL	6600	F4	RS P	I	621
379	SAFE-2D, PLANE & AXISYMMETRIC STRESS ANALYSIS	GGA	1108	F4	RS P	I	623
380	GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z MESH	GGA	1108	F4	RS P T	C	625
381	LYNNE, WOODS-SAXON POTENTIAL SHAPE CALCULATION	ORNL	7090	F2	PS	A	627
R382	RAPP, HIGH-VELOCITY FLOW STUDY STEAM-WATER MIX	KAPL	6600	F4	RS P	H	628
R383	MO266, LINEAR ELASTIC STRUCTURAL DYNAMICS	BAPL	6600	F4	RS P T	I	630
384	CHECKER,CRECT,DAMMET,PLOTFR,... ENDF/B V1 PROC	PNL	6600B	F4	RS T	M	632
385	COHBE, COHERENT INELASTIC SCATTERING LAW CALC	GGA	1108	F4	RS P X	A	635
386	DATATRAN, MODULAR PROGRAMMING AND DATA SYSTEM	KAPL	6600B	F+COM	R T	M	637
387	CITATION, 1,2,3-D DIFFUSION DEPLETION MULTIGP	ORNL	3600H	F4	RS P T	K	639
388	ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR 1DX	HECL	1108B	F4	RS P X T	B	641
R389	STINT3, SINGLE-CHANNEL SPACE-TIME SYNTHESIS	KAPL	6600	F4	RS P	F	644
390	CORGAM, UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA	KSUN	360	F4	RS P	O	646
R391	SCRSOB, PRESSURE VESSEL STRESS AND FATIGUE	KAPL	6600	F4	RS	I	648
392	RAFFLE, 1ST FLIGHT COLLISION PROBABILITIES MC	ORNL	3608	F+BAL	RS P T	B	650
393	XSDRN, DISCRETE ORDINATE MULTIGROUP CONSTANTS	ORNL	360	F4	RS PLX T	B	652
R394	JITER, FLUCTUATION EXPERIMENT ANALYSIS	BAPL	6600	F4	RS P T	O	654
395	FLAC, STEADY-STATE FLOW, PRESSURE DISTRIBUTION	GGA	1108	F5	RS P	H	656
R396	WASP, WATER AND STEAM THERMODYNAMIC PROPERTIES	BAPL	6600	F4	RS P T	H	658
R397	GAPL3, INELASTIC LARGE DEFLECTION STRESS STUDY	BAPL	6600	F+COM	RS P T	I	660
R398	BE21, FEW-GP DISCRETE ORDINATES SLAB GEOMETRY	BAPL	6600	F4	RS P T	C	662
R399	SUMOR, S-WAVE NEUTRON X-SECTION CALCULATION	BAPL	6600	F4	RS P T	A	664
400	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	360	F4	RS P T	F	666
400	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	6600	F4	RS P T	F	666
401	GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR MESH	GGA	1108	F+BAL	RS P T	C	668
R402	SABOR4, DISCRETE-ELEMENT ANALYSIS THIN SHELLS	MIT	360	F4	RS P T	I	670
R403	TIGIR2, MODULAR DOCUMENT INFORMATION SYSTEM	KAPL	6600B	F+ASC	RSB X T	M	673

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405	NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK	BNL	6600	F4	RS P T	F	677
406	DATATRAN 2-D GEOMETRY INPUT, PREPARATION, EDIT	KAPL	6600B	F+ASC	R T	L	679
407	DATATRAN UTILITY MODULES, 2-D & 3-D PLOTTING	KAPL	6600B	F+ASC	R T	P	681
R407	DATATRAN UTILITY MODULES, 2-D + 3-D PLOTTING	KAPL	6600	F+ASC	RS P T	P	681
408	TAC2D, STEADY-STATE AND TRANSIENT TEMP CALC	GGA	1108	F5	RS P T	H	683
409	LARCA, FLUX-WEIGHTING OF DTF4 CROSS SECTIONS	LASL	6600	F4	RS P	N	685
410	TACASI, ANALYSIS OF RESONANCE MEASUREMENTS	GGA	1108	F4	RS P T	A	687
R411	MU661,MU657,MU626, POLYNOMIAL CURVE FITTING	BAPL	6600	F4	RS P T	P	689
R412	MANE1, RECTANGULAR MAGNETIC NETWORK SOLUTION	BAPL	6600B	F4	RS P T	I	691
413	ALPHA-M, RESOLUTION OF GAMMA RAY SPECTRA	CRNL	360	F4	RS P	O	693
414	TAC3D, TRANSIENT 3-D HEAT TRANSFER PROGRAM	GGA	1108	F5	RS P T	H	695
415	CFXE,INCEXE, 1-GP 3-D XYZ XENON OSCILLATION	CEND	360	F4	RS P X T	F	697
416	PART1, OPTIMAL GROUP OR MESH COLLAPSING	TRW	6500	F4	RS P	B	699
417	ATHENA4, INELASTIC SCATTERING FORM FACTORS	CRNL	360	F4	RS P T	A	701
418	CHAINS, ANALYSIS OF RADIOACTIVE DECAY CHAINS	GEC	635	F4	RSBP	D	703
419	CASCADE,CLUSTER, RADIATION DAMAGE IN METALS	GEC	635	F+FAP	RSBP T	Q	705
420	GROUSF, SPACE-DEPENDENT X-SECTION GENERATION	GEC	635	F4	RSBP T	B	707
421	MICHRD, MICROHARDNESS MEASUREMENT ANALYSIS	GEC	635	F4	RSBP	C	709
422	SPECTRA, MC CALCULATION IRRADIATED MATERIAL	GEC	7090	FAP	RSBP X T	Q	711
423	DOS, NEUTRON FLUX-DOSIMETER ACTIVITY RELATION	GEC	635	F4	RSBP	D	713
R424	GLUR1, WATER-LOGGED FUEL ELEMENT ANALYSIS	BAPL	6600	F4	RS P T	H	715
R425	REDUX, REACTOR FLUCTUATION EXPERIMENT ANALYSIS	BAPL	6600	F4	RS P T	D	717
R426	PAX03, HARMONY-PDQ X-SECTION GENERATION CODE	BAPL	6600	F+COM	RS P X T	B	719
427	FARED, 1-D FAST REACTOR DESIGN & SURVEY STUDY	EW	6600	F+COM	RS P X T	D	721
R428	DOGGY, DESK CALCULATOR FORM SHEET OP PACKAGE	KAPL	6600	F+ASC	RS P T	P	725
R429	ASPIS, GAMMA RAY SOURCE BUILDUP FACTOR CALC	BAPL	6600	F+ASC	RS P T	J	727
430	GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL	GGA	1108	F+BAL	RS P T	C	729
431	SUPERTOC, ENDF/B FINE-GP CONSTANTS GENERATION	CRNL	360	F4	RS P T	B	731
432	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	6600C	F4	RS P T	H	733
432	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	1108C	F4	RS P T	H	733
432	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	360C	F4	RS P T	H	733
433	CONTEMPT-LT/022, PRESSURE-TEMPERATURE RESPONSE	ANC	360B	F+BAL	RSBP CT	G	735
434	HEATMESH, GEOMETRICAL DATA HEAT TRANSFER STUDY	SLL	6600	F4	RS P	N	738
435	BURST1, HYDRODYNAMIC ANALYSIS DURING BLOWDOWN	FPCC	360	F4	RS P X	G	740
436	ETOM1, ENDF/B FORMAT TO MUFT FORMAT X-SECTIONS	WAPD	6600	F4	RS P T	B	742
437	ETOG1, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT	WAPD	6600	F4	RS PL T	B	744
438	BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP XY, RZ	GGA	1108	F+BAL	RS P T	D	747
439	BUGTRI, 2-D MULTIGP DIFFUSION+BURNUP TRI-MESH	GGA	1108	F+BAL	RS P T	D	749
440	DYNAM, DYNAMIC ANALYSIS BOILING FLOW STEAM	GGA	1108	F4	RS P T	H	751
441	PWCOST, REACTOR FUEL CYCLE COST CALCULATION	GGA	1108	F4	RS P T	D	753
R442	SIMPLEF1, TIME-SHARING PROGRAMMING LANGUAGE	KAPL	6600	F+ASC	RS	P	755
443	HAB3, COAGULATION OF HETEROGENEOUS AEROSOLS	AI	360	F4	RS P T	G	757
R444	ROPE, FINDING ROOTS OF A POLYNOMIAL	KAPL	6600	F4	RS P	P	759
R445	LIZARD, NONLINEAR DIFFERENTIAL EQNS. SOLUTION	KAPL	6600	F+ASC	RS P T	P	761
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447	ETOG1 DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2	WAPD	6600	BCD	R L T	Z	764
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R448	FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION	MA-G	360	F4	RSBP CT	G	766
R449	CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION	BAPL	6600	F4	RS P T	I	768
R449	CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION	TVA	360	F4	RS P T	I	768
450	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE	OP	360B	F+BAL	RSBP CT	C	770
450	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE	BEC	6600	F+COM	RS PLX T	C	770
450	KENO, MONTE CARLO MULTIGROUP CRITICALITY CODE	CRNL	360	F+BAL	RSBPL CT	C	770
451	SAFE-CRACK, VISCOELASTIC ANALYSIS OF CONCRETE	GGA	1108	F5	RS P T	I	772
452	SHELL5, THIN SHELL 3-D STRUCTURAL ANALYSIS	GGA	1108	F5	RS P T	I	774
453	RICF, PRIMARY RECOIL ATOM SPECTRA ENDF/B DATA	CRNL	360	F4	RS P T	B	776
454	PHENIX, 2D DIFFUSION BURNUP REFUELING HISTORY	LASL	6600	F4	RS P T	D	778
455	DAC1, SN PERTURBATION CODE USING DTF4 FLUXES	LASL	6600	F4	RS P	N	781
456	DBUFIT1, LEAST SQUARES TRANSMUTATION ANALYSIS	BNW	1108	F5	RS P T	D	783
457	GSSLRN1B, LEAST SQUARES PHOTOPEAK SPECTRA CODE	BNW	1108	F+BAL	RS P T	O	785
458	VELVET2, TURBULENT FLOW IN LMFBR ROD BUNDLE	NEC	635	F4	RS P T	H	787
459	DOT2DB, 2-D MULTIGROUP DIFFUSION & SN THEORY	NEC	635	F4	RS P T	C	789
460	LIFE1, FAST REACTOR FUEL ELEMENT BEHAVIOR	ANL	360	F4	RS P T	I	791
R461	EPOCH, NEUTRON AGE CALCULATION OF ENDF/B DATA	BAPL	6600	F4	RS P T	B	793
R462	SPAN4, A POINT-KERNEL SHIELD EVALUATION CODE	PAPL	6600B	F+ASC	RS P T	J	795
463	3DOT, 3-D MULTIGROUP DIFFUSION XYZ R-THETA-Z	LASL	6600	F4	RS P T	C	799
R464	DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	KAPL	6600	F4	RS P	O	801
R464	DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	ANL	360	F4	RS P	O	801
465	RESEND,ADLER, ENDF/B RESONANCE XSECTION CODES	BNL	6600B	F4	RS P T	A	803
466	APREX1, 99-GP DLC-2B LIBRARY GROUP COLLAPSING	APRF	6600	F4	RS	B	806
467	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	BNW	1108	F4	RS PLX T	B	808
467	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	TVA	360	F4	RS PLX T	B	808

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R468	BUBL1, FUEL SWELLING & GAS RELEASE SIMULATION	BAPL	6600	F4	RS P T	I	810
469	PMS1, FAST NEUTRON POLARIZATION EXPERIMENT	UCND	360B	F+BAL	RS P	C	812
R470	GRAMP, R-M PARAMETERS OF UNRESOLVED RESONANCES	BAPL	6600	F4	RS P	A	814
471	GAPER2D, 2-D PERTURBATION CALC FROM 2DF OUTPUT	GGA	1108	F5	RS P T	N	816
472	MERMC2,MAGIC, MC**2 LIBRARY SERVICE ROUTINES	ANL	360C	36F	RSBP T	M	818
472	MERMC2, MC**2 BINARY LIBRARY TAPE MAINTENANCE	ANL	360	F4	RS	M	818
R473	CHIC-KIN, FAST + INTERMEDIATE POWER TRANSIENTS	BAPL	6600	F4	RS P T	H	820
474	QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE	ANL	3600	3EF	RS PL CT	F	822
474	QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE	ANL	360	F4	RS PL CT	F	822
475	CRECT,CHECKER,PICEL,PLOTFB,... ENDF/B V2 PROC	BNL	6600B	F4	RS T	M	825
475	CRECT,CHECKER, ENDF/B V2 PROCESSING CODES	ANL	360	F4	RS P T	M	825
476	CAGE,BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS	GEES	1108	F5	RS P T	O	829
R477	3DXT,DEP3, 3-D XENON TRANSIENT & DEPLETION	KAPL	6600	F4	RS P T	D	831
478	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.3	CDC	6600D	F+COM	RS T	P	833
478	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE2.0	CEND	7600B	F4	RS T	P	833
478	BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.	BW	6600R	F+ASC	RS T	P	833
478	BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.	BAPL	6600A	F+ASC	RS T	P	833
478	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.2	CDC	6600C	F+COM	RS T	P	833
479	FREADM1, FAST REACTOR CORE ACCIDENT ANALYSIS	NEC	635	F4	RS P T	G	836
480	FUMBLE, FAST REACTOR FUEL BURNUP & MANAGEMENT	NEC	635	F4	RS P T	D	839
R481	BUSHL, CYL SHELL BUCKLING COLLAPSE ANALYSIS	BAPL	6600	F4	RS P T	I	841
482	COMNUC,CASCADE, COMPOUND NUCLEUS REACTION	AI	360	F+BAL	RS P T	A	843
483	REPP, THERMAL-HYDRAULIC WATER REACTOR DESIGN	BNW	1108	F5	RS P T	H	845
484	FIGS, IBM360&2250 FORTRAN GRAPHICS SUBROUTINES	AI	360	F+BAL	RS T	P	847
R485	GASPAN, COMPLEX GAMMA-RAY SPECTRA ANALYSIS	KAPL	6600	F4	RS T	O	849
486	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	ANL	360	F4	RS P T	E	851
486	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	LASL	6600	F4	RS P T	E	851
487	STEAM-67, 1967 ASME STEAM AND WATER PROPERTIES	BGEE	360P	F4	RS T	H	853
488	NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES	BNW	1108	F5	RS P X T	F	855
488	NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES	BNW	7090	F4	RS P T	F	855
489	TRIFIDO, PULSED NEUTRON SOURCE DATA ANALYSIS	CNEA	360	F4	RS P	E	857
490	JOSHUA, DATA STORAGE, RETRIEVAL, AND DISPLAY	CP	360	F+BAL	S T	M	859
491	MOD5, STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN	NPGS	360	F4	RS P X T	E	861
492	RAMP1, REICH-MOORE RESOLVED REGION X-SECTIONS	BNL	6600	F4	RS P	A	864
493	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE	NEC	635	F4	RS P T	M	866
493	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE	NEC	1108	F5	RS P T	M	866
494	ADEP, 1D AND 2D FEW-GROUP SPACE-TIME KINETICS	BCL	6400	F4	RS P T	F	868
495	SYN, 2D SYNTHESIS MULTIGR DIFF & 1GR DEPLETION	NEC	635	F+GMP	RS P T	D	870
R496	KAPLPLOT, KAPL CALCOMP PLOTTING ROUTINES	KAPL	6600	F+COM	RS T	P	873
R497	RELOI, RELIABILITY FOR A SINGLE FAILURE MODE	BAPL	6600	F4	RS P	P	875
498	CONCEPT3, POWER PLANT CONCEPTUAL COST ESTIMATE	ORNL	360C	F4	RS P XCT	D	877
499	MIRAH,MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL	BCL	6400	F4	RS P X	G	879
500	FRCPL2, LOCA FISSION PRODUCT RELEASE ANALYSIS	BCL	6400	F4	RS P	G	882
501	ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B DATA	GESV	635	F+GMP	RS F XCT	B	884
502	EDITOR, ENDF/B TAPE PROCESSING AND EDITING	ORNL	6600	F4	RS P T	M	887
502	EDITOR, ENDF/B TAPE PROCESSING AND EDITING	ORNL	360B	F4	RS PL CT	M	887
R503	DUZ2, 2-D AXISYMMETRIC & PLANE ELASTIC-PLASTIC	BAPL	6600	F+COM	RS P T	I	889
504	THRESH, STATISTICAL MODEL REACTION X-SECTIONS	BNL	6600	F4	RS P	A	892
505	TDOWN, SPATIAL & COMPOSITION-DEPENDENT X-SECS	GESV	635	F+GMP	RS P XCT	L	894
R506	JP1XP, COUPLED-CHANNEL SCATTERING X-SEC CALC	KAPL	6600	F4	RS P T	A	896
R507	PHASER, PHASE SHIFT X-SEC & POLARIZATION CALC	KAPL	6600	F4	RS P T	A	898
508	MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC	BCL	6400	F4	RS P X T	G	900
509	ETOT2, THERMAL LIBRARIES FROM ENDF/B DATA	WAPD	7600	F4	RS P T	B	902
510	VIMIX, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS	AI-A	360	F4	RSHPL CT	C	904
510	VIMI, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS	AI	7600	F4	RS PLX T	C	904
511	VENUS, 2-D LMFBR POWER EXCURSION DISASSEMBLY	ANL	360	F4	RS P XCT	F	907
512	THETA1-B, FUEL ROD THERMAL RESPONSE LOCA	ANC	360	F4	RSBP X T	G	910
513	TESS, 1-D SLAB AND SPHERE GEOM SN TRANSPORT	ANL	3600	F36	RS P XCT	C	912
514	FORSIM, SOLN OF SYSTEM OF ORDINARY DIFF EQNS	ORNL	6600	F4	RS P	P	914
515	GENED ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.	NEC	635	F+GMP	RS T	P	916
516	PTAC11, 2-PASS ASSEMBLER FOR THE PDP-11 ON 360	ANC	360	PL1	RS P T	P	920
517	HEATING3, 1,2, OR 3-D HEAT CONDUCTION PROGRAM	ORNL	360	F4	RS P T	H	922
518	ERREST, LOCA ROD BUNDLE CHF DATA ANALYSIS	ANC	360	F4	RS FL CT	M	924
519	NETS-RJE, OS/360 MVT REMOTE JOB ENTRY SYSTEM	ANC	360	BAL	RSB T	P	926
520	PHROG, MULTI-GR CONSTANT & FAST SPECTRA CALC	ANC	360	F4	RS PLXCT	B	928
521	SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS	ANL	360	F4	RS P	G	930
521	SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS	HFEL	1108	F4	RS P	G	930
522	ARC-SYSTEM, SYSTEM SUBPROGRAMS AND MODULES	ANL	360	F+BAL	RS P CT	M	932
523	FSP, MONTE CARLO REACTOR ANALYSIS CALCULATION	ORNL	360	F+BAL	RSBPL CT	C	934
524	BESFIT, DIFFRACTION MODEL ELASTIC SCAT X-SEC	BNL	6600	F4	RS P	A	936
525	ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION	ORNL	360	F4	RS P X T	H	938
526	CLUP77, SQUARE CELL COLLISION PROBABILITY CALC	JAER	230	F4	RS P T	B	940
526	CLUP77, SQUARE CELL COLLISION PROBABILITY CALC	ANL	360	F4	RS P T	B	940

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528	PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES	ANC	1108	F4	RS P T	G	944
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530	GENPD, FREE-FORMAT CARD INPUT PROCESSOR	LASL	6600	F4	RS P	L	948
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548	CEBUG, STEAM GENERATOR SODIUM-WATER REACTION	CEND	7600	F4	RS P T	G	987
549	BIGDEAL, SPENT YANKEE-FUEL TEMPERATURE CALC	ORNL	1604	F2	RS P	H	989
550	REXCO-H, 2-D HYDRODYNAM RESPONSE TO EXCURSION	ANL	360	F4	RS P CT	F	991
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551	MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC	ANC	360	F4	RSBP XCT	H	993
552	PWR-PDM, BORATION-DILUTION TABLES FOR PWR OPN	CPPD	6400	F4	S P	H	995
553	U3R, UNRESOL RESONANCE XSEC PROBABILITY TABLES	AI	360	F+BAL	RS P CT	B	997
554	DISPER, AEROSOL PARTICLE TRANSPORT STUDY	REC	3600	F36	RS P	G	999
555	PARFT, WATER-COOLED CORE TRANSIENT ANALYSIS	ANC	360	F+BAL	RSBPL CT	G	1001
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563	AMDLIBF, ARGONNE SUBROUTINE LIBRARY CAT. F	ANL	360	F+BAL	RS T	P	1022
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571	RIGEL, ENDF/B V3 DATA PROCESSING CODE	ANL	360	F4	RS T	M	1044
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573	TWOTRAN-PNXW, 2-D PARTICLE TRANSPORT XY RZ RTH	LASL	7600	F4	RS P T	C	1049
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588	ORCOST, POWER PLANT CAPITAL COST ESTIMATING	ORNL	360B	F4	RS P T	D	1084
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594	APC-XSEC1, MICROSCOPIC X-SECTION MANIPULATION	ANL	360	F4	RSBPL CT	L	1096
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R598	PELEN, FUEL PELLET TEMPERATURE & DEFORMATION	BAPL	6600	F4	RS P T	I	1107
599	TOPLYR2, POWER PLANT THERMAL DISCHARGE STUDY	HEDL	1108	F5	RS P T	R	1109
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609	INDX, XRAY DIFFRACTION POWDER PATTERN INDEXING	LASL	6600	F+COM	RS P T	Q	1129
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610	FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....	ANL	1108	F5	RS P X T	P	1131
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617	KEFF,MGBS,TGAN, NUCLEAR CRITICALITY SAFETY	DP	360	F4	RS P T	C	1149
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625	VARI-1D, 1-D VARIATIONAL SENSITIVITY	ANL	360	F4	RSBPL CT	C	1167
626	ARC-DIF1D, 1-D MULTI-GP DIFFUSION & INVENTORY	ANL	360	F4	RSBP CT	C	1169
627	TOODY2, 2-D LAGRANGIAN EQNS OF MOTION SOLUTION	SLA	3600	F36	RS P T	S	1171
628	ETCT3, ENDF/B V3 DATA TO THERMAL LIBRARY FORM	WAFD	7600	F4	RS P T	B	1173
629	ORRIBLE, ROD BUNDLE FLOW & TEMPERATURE DIST.	CRNL	360	F4	RS P T	H	1176
630	LATIN SQ, NXN LATIN SQUARE EXPERIMENTAL DESIGN	MLMC	360	F4	RSBP C	P	1178
631	RAFFLE-ANC, MONTE CARLO NEUTRON TRANSPORT CODE	ANC	360	F4	RSBPL CT	C	1180
632	MMM3, COORDINATE ANALYSES SEMI-RIGID MOLECULES	ANC	360	F4	RS P	W	1182
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636	GKILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	360	F+BAL	RS P CT	H	1193
637	GAMTAB, RADIOACTIVE-DECAY GAMMA RAY CATALOG	DP	360B	EPCOC	R L T	Z	1195
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ARGONNE CODE CENTER: COMPILATION OF PROGRAM ABSTRACTS

by

M. K. Butler, M. DeBruler, H. S. Edwards,
C. Harrison, Jr., Catherine E. Hughes, Marianne Legan,
T. Menozzi, L. Ranzini, and Anthony J. Strecok

PREFACE

As originally published ANL-7411 was the second complete revision of program abstracts undertaken by the Code Center since its inception in 1960. This revision eliminated from the collection those programs for machines of the 704 era and earlier. With the assistance of installation representatives and authors, existing program abstracts were revised and material added to the library to complete, whenever possible, the program package for each program in the Center's collection.

The table of contents lists in order of accession, the KWIC title of each program, the originating installation, the machine, the programming language, the package symbols, and the category. This title information is then used to provide the index which follows the abstracts. The package symbols included are defined as follows:

R = reference report or document,

S = source deck or tape,

B = binary or run deck or tape,

P = sample problem data,

L = library information, e.g., cross-section library, random-number library,

X = auxiliary routines or information,

C = control or operating system language statements,

and

T = magnetic tape(s) required for transmittal of card and/or tape material.

This collection includes programs in which the program number is preceded by the letter R, G, or S. The letter R denotes restricted, and U. S. citizens are required to file a release form with the Center for use of the program on either official U. S. government or commercial (nonmilitary) applications at a U. S. installation. The letter G designates programs which

are limited to use on U. S. government contracts only. In addition to the release form requirement, the contract identification, and the signature of the contracting officer must be furnished when requesting such programs. The Code Center is not authorized to distribute these programs outside the United States. The letter S is used to identify packages which are distributed to a special list of designated recipients only.

To best service the interests of ERDA contractors, university nuclear engineering departments, and the nuclear industry, the Center will, upon request, supply to an installation, a copy of any of the material listed as available under Item 16 of the abstract. Should that installation modify the program, convert it to a usable form on another computer, uncover an error, or have difficulty in using the program, they are asked to notify the Center so that their efforts in turn might benefit other recipients. The Center maintains records of the recipients of all library material so that if a correction or new version is prepared, all previous recipients of the program are notified promptly.

Program abstracts for the OECD Nuclear Energy Agency Computer Program Library programs in the Argonne Code Center collection have not been included in this compilation. Separate compilations are distributed regularly to our contributing installations.

I. HISTORY AND ACKNOWLEDGMENTS

In 1956, at the Second Annual Meeting of the American Nuclear Society, the initial meeting of an informal group called the Nuclear Codes Group was held. This group was composed of "persons interested in the development and use of computer programs for reactor design." The group held regular meetings in conjunction with the semiannual ANS meetings and published and distributed a Newsletter containing code abstracts submitted by members. These abstracts followed the format of the Atomic Energy Commission document AECU-3078, "A Bibliography of Available Digital Computer Codes for Nuclear Reactor Problems."[1]

From September 1956 to December 1959, ten Newsletters were published and distributed through the auspices of the AEC Computing Facility at New York University.[2] In 1959, Ward Sangren and personnel at General Atomics edited and published 300 abstracts collected from Group members.[3] A supplementary list of 100 abstracts was published the following year.[4]

In 1959 also, the Nuclear Codes Group became the nucleus of the American Nuclear Society's Mathematics and Computation Division. With stature came a desire for a central facility for the computer program library

17. CATEGORY - I
KEYWORDS - COOLANTS, PRESSURE, TEMPERATURE, FLUID FLOW

1. NAME OR DESIGNATION OF PROGRAM - TEMPEST2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM7090,360, CDC1604

3. DESCRIPTION OF PROBLEM OR FUNCTION - TEMPEST2 IS A NEUTRON THERMALIZATION PROGRAM BASED UPON THE WIGNER-WILKINS APPROXIMATION FOR LIGHT MODERATORS AND THE WILKINS APPROXIMATION FOR HEAVY MODERATORS. A MAXWELLIAN DISTRIBUTION MAY ALSO BE USED. THE MODEL USED MAY BE SELECTED AS A FUNCTION OF ENERGY. THE SECOND-ORDER DIFFERENTIAL EQUATIONS ARE INTEGRATED DIRECTLY RATHER THAN TRANSFORMED TO THE RICCATI EQUATION. THE PROGRAM PROVIDES MICROSCOPIC AND MACROSCOPIC CROSS SECTION AVERAGES OVER THE THERMAL NEUTRON SPECTRUM.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - 1 TO 2 MINUTES ARE REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - SOFOCATE, KATE

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1962.
IBM7090 VERSION SUBMITTED MARCH 1962.
CDC1604 VERSION SUBMITTED MARCH 1964.
IBM360 VERSION SUBMITTED JUNE 1967, REPLACED BY EDITION B FEBRUARY 1974.

10. REFERENCES - R. H. SHUDDE, TEMPEST-II, NAA PROGRAM DESCRIPTION, 1960, AND THREE SUPPLEMENTS 1960,61.
R. H. SHUDDE AND J. DYER, TEMPEST II - A NEUTRON THERMALIZATION CODE, AMTD-111, JUNE 1962.
R. H. SHUDDE, TEMPEST - CONVERSION OF A DECIMAL CROSS SECTION LIBRARY TO A BINARY CROSS SECTION LIBRARY, AMTD-112, NOVEMBER 1961.
R. H. SHUDDE, TEMPEST - A BINARY CROSS-SECTION LIBRARY READER, AMTD-113, NOVEMBER 1961.
R. H. SHUDDE, SOFOCATE LIBRARY TO TEMPEST LIBRARY CONVERTER, AMTD-114, NOVEMBER 1961.
R. H. SHUDDE, PREPARATION OF CROSS-SECTIONS FOR THE TEMPEST DECIMAL LIBRARY, AMTD-115, NOVEMBER 1961.
TEMPEST II, NOTES CONCERNING THE CONTROL DATA VERSION.

11. MACHINE REQUIREMENTS - 32K MEMORY

12. PROGRAMMING LANGUAGES USED - FORTRAN II AND FAP (IBM7090), FORTRAN 63 (CDC1604), AND FORTRAN IV (IBM360)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - IBSYS (7090) AND OS360 (360).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

7090 R. H. SHUDDE AND J. DYER
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CANOGA PARK, CALIFORNIA

360 G. GOWINS
BOEING HUNTSVILLE SIMULATION CENTER
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HUNTSVILLE, ALABAMA 35807

1604 S. ELKIN
NUCLEAR APPLICATIONS COMPUTATION CENTER
CONTROL DATA CORPORATION
COMPUTER DIVISION
3145 PORTER DRIVE
P. O. BOX 10111
PALO ALTO, CALIFORNIA 94303

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (7090-2145 CARDS, 1604-1298 CARDS, AND 360-1280 CARDS)
SAMPLE PROBLEMS (7090-10 CARDS, 1604-11 CARDS, AND 360-21 CARDS)
LIBRARIES (7090-765 CARDS, 1604-741 CARDS, AND 360-764 CARDS)
SAMPLE PROBLEM OUTPUT (360-14 SELECTED PAGES)
REFERENCE REPORTS, NOTES

17. CATEGORY - B
KEYWORDS - THERMALIZATION, WIGNER-WILKINS MODEL LIGHT MODERATORS, WILKINS EQUATION HEAVY MODERATORS, MAXWELL DISTRIBUTION, THERMAL SPECTRA

1. NAME OR DESIGNATION OF PROGRAM - FORM

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM7090,370, CDC1604

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE FORM, OR FORTRAN-MUFT, PROGRAM IS A FOURIER TRANSFORM SLOWING-DOWN CODE. A LIBRARY TAPE CONTAINING 54-GROUP MICROSCOPIC CROSS SECTIONS, RESONANCE PARAMETERS, INELASTIC SCATTERING MATRICES, AND SOURCE SPECTRA IS USED TO GENERATE A 54-GROUP FLUX SPECTRUM AND FEW-GROUP CONSTANTS.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - ABOUT 5 TO 6 SECONDS ARE REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - MUFT, LIBRARY EDITING ROUTINES ARE INCLUDED AS AUXILIARY CODES. AITP1 PREPARES THE IBM370 VERSION BINARY LIBRARY TAPE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1962.
IBM7090 VERSION SUBMITTED MARCH 1962.
CDC1604 VERSION SUBMITTED MARCH 1964.
IBM370 VERSION SUBMITTED JULY 1972, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - D. J. MCGOFF, FORM, A FOURIER TRANSFORM FAST SPECTRUM CODE FOR THE IBM709, NAA-SR-MEMO-5766, 1960.
FORM, NOTES CONCERNING THE CONTROL DATA VERSION.
ATOMICS INTERNATIONAL FORM CROSS-SECTION LIBRARY, AI NOTE, NOVEMBER 1962.
P. KAZEMERSKY AND S. NAKAMURA, THE FORM CODE, OHIO STATE MODIFICATIONS TO NAA-SR-MEMO-5766, 1972.

11. MACHINE REQUIREMENTS - 32K WITH 2 TAPE UNITS

12. PROGRAMMING LANGUAGES USED - FORTRAN II (IBM7090), FORTRAN 63 (CDC1604), FORTRAN IV (IBM370)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - FORTRAN MONITOR SYSTEM (IBM7090), COOP (CDC1604), OS/370 (IBM370).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
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ACC ABSTRACT 80 03/75

1. NAME OR DESIGNATION OF PROGRAM - SOR3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - SOR3 IS USED FOR THE ANALYSIS OF SYMMETRICALLY LOADED SHELLS OF REVOLUTION. THE PROGRAM COMPUTES STRESSES, STRAINS, FORCES AND DEFLECTIONS PRODUCED BY THERMAL AND MECHANICAL LOADS. NORMAL AND TRANSVERSE SHEAR STRESSES AND WALL THICKNESS CHANGES ARE TAKEN INTO ACCOUNT. THE PROGRAM IS BASED ON CONSTITUTIVE EQUATIONS WHICH RETAIN TERMS THROUGH THE SECOND ORDER IN THE RATIO OF THE THICKNESS TO THE LOCAL RADII OF CURVATURE. THESE FEATURES MAKE THE PROGRAM APPLICABLE TO SHELL STRUCTURES WITH MODERATELY LARGE THICKNESS TO RADIUS RATIOS.

4. METHOD OF SOLUTION - THE NUMERICAL INTEGRATION OF THE GOVERNING DIFFERENTIAL EQUATIONS IS PERFORMED BY A VARIABLE INTERVAL SIZE ADAMS-MOULTON METHOD. THE PROBLEM IS FIRST CONVERTED FROM A TWO-POINT BOUNDARY VALUE PROBLEM TO AN INITIAL-VALUE PROBLEM. FIVE SEPARATE INTEGRATIONS WITH DIFFERENT SETS OF INITIAL CONDITIONS ARE REQUIRED. EACH INTEGRATION PROCEEDS WITH AUTOMATIC ADJUSTMENT OF INTERVAL SIZE FOR MAXIMUM SPEED WITHIN THE LIMITATION OF PRESET BOUNDS ON THE ASSOCIATED TRUNCATION ERROR.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   30 SHELLS INTO WHICH THE STRUCTURE IS DIVIDED
   30 INPUT POINTS FOR THE SHELL
   10 POINTS AT WHICH DETAILED STRESS PRINTOUT IS TO BE PROVIDED FOR BRITTLE FRACTURE PURPOSES

6. TYPICAL RUNNING TIME - AN AVERAGE TIME OF 10 SECONDS PER CASE IS REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM - SOR3 HAS A BRANCHED-SHELL OPTION WHICH AUTOMATICALLY PERFORMS THE CUT AND FIT OPERATIONS ASSOCIATED WITH THE ANALYSIS OF SUCH STRUCTURES AS A PRESSURE VESSEL CONNECTED TO A SUPPORT SKIRT. SPECIAL OUTPUT OPTIONS TAILORED TO THE NEEDS OF STRESS, FATIGUE AND BRITTLE FRACTURE DESIGN EVALUATIONS ARE AVAILABLE.

8. RELATED AND AUXILIARY PROGRAMS - SOR3 IS AN EXTENSION OF THE EARLIER SOR2 PROGRAM. ONE OF THE SOR3 OPTIONS PROVIDES FOR PUNCHED CARD OUTPUT WHICH CAN BE FED DIRECTLY TO SORSDB (ACC ABSTRACT 391), A KAPL PROGRAM WRITTEN TO FACILITATE THE CHECKING OF A GIVEN DESIGN AGAINST STRUCTURAL DESIGN BASIS CRITERIA.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1968.
   CDC6600 VERSION OF SOR2 SUBMITTED JUNE 1968, REPLACED BY REVISED EDITION JULY 1969, REPLACED BY SOR3 FEBRUARY 1973, CORRECTED JULY 1974.

10. REFERENCES - J. R. FITCH AND R. L. FAGAN, SOR-3, A PROGRAM FOR THE STRESS ANALYSIS OF SHELLS OF REVOLUTION, KAPL-M-7100(L), AUGUST 30, 1971.

J. A. MIRABAL AND D. G. DIGHT, SOR-II - A PROGRAM TO PERFORM STRESS ANALYSIS OF SHELLS OF REVOLUTION, KAPL-2292, SEPTEMBER 15, 1963.

F. C. CARLSON AND R. E. DOBSON, SORSDB, A COMPUTER PROGRAM FOR THE STRESS AND FATIGUE EVALUATION OF SHELLS OF REVOLUTION, KAPL-M-6729, APRIL 1969.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.0.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (3285 CARDS)
SAMPLE PROBLEM (351 CARDS)
SAMPLE PROBLEM OUTPUT (72 SELECTED PAGES)
REFERENCE REPORT, KAPL-M-7100(L)

17. CATEGORY - I
KEYWORDS - STRESSES, SHELLS, SPHERES, CYLINDERS, TEMPERATURE DISTRIBUTION, SOR2 CODES, SORSDB CODES

ACC ABSTRACT 146 04/75

1. NAME OR DESIGNATION OF PROGRAM - NPRFCCP

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600, IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - NUCLEAR FUEL CYCLE COSTS IN DOLLARS PER YEAR ($/YR), AND IN MILLS PER KILOWATT-HOUR (MILLS/KWHR) ARE COMPUTED AND TABULATED FOR EACH REGION OF A MULTIREGION REACTOR CORE, ON THE BASIS OF AEC-LEASED NUCLEAR FUEL MATERIAL AND OF PRIVATELY-OWNED NUCLEAR FUEL MATERIAL. FUEL CYCLE COSTS ARE COMPUTED SEPARATELY FOR EACH REGION OR ZONE, FOR CORE DESIGNS OF ANY CONFIGURATION OR COMBINATION OF MATERIAL DEPLETION OR ENRICHED URANIUM FUEL OR OTHER SPECIAL NUCLEAR MATERIAL. PRINTED OUTPUT OF THE PROGRAM INCLUDES (A) DETAILED FUEL CYCLE COSTS FOR EACH ZONE IN TABULAR FORM, FOR AEC-LEASED AND PRIVATELY-OWNED NUCLEAR FUEL MATERIAL, RESPECTIVELY, (B) A SUMMARY TABULATION OF NUCLEAR FUEL COSTS FOR ALL REGIONS OF THE COMPLETE CORE, INCLUDING FIXED CHARGES ON WORKING CAPITAL REQUIRED FOR CORE FABRICATION AND FOR NUCLEAR FUEL MATERIAL, (C) A SUMMARY TABULATION OF CERTAIN COMPUTED PERFORMANCE AND ECONOMIC DATA, VIZ., AVERAGE RESIDENCE TIME, ANNUAL FUEL THROUGHPUT, UNIT ELECTRICAL ENERGY YIELD, ANNUAL POWER GENERATION, AND CORE FABRICATION COSTS, AND (D) A TABULATION OF ALL INPUT DATA FOR ALL REGIONS. THE PRINTING OF DATA DESCRIBED IN (A) AND (D) ABOVE IS OPTIONAL WITH PROGRAM USE.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -
   MAXIMUM NUMBER OF REGIONS OR ZONES = 10

6. TYPICAL RUNNING TIME - 1 TO 2 MINUTES ARE REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM - CERTAIN OF THE OPERATING AND ECONOMIC PARAMETERS WILL GENERALLY REMAIN CONSTANT FOR A WIDE RANGE OF REACTOR CORE DESIGNS. THEREFORE, THE PROGRAM INCLUDES A SET OF STANDARD VALUES FOR THESE PARAMETERS SO THAT THE AMOUNT OF BASIC INPUT DATA REQUIRED IS MINIMAL. THE USE OF THESE SO-CALLED STANDARD VALUES IS OPTIONAL WITH THE PROGRAM USER, AND ANY COMBINATION OF OR ALL OF THESE STANDARD VALUES MAY BE MODIFIED AS DESIRED. FUEL PROCESSING COSTS MAY BE COMPUTED FOR SPENT-FUEL MANAGEMENT PROGRAMS WHICH PROVIDE FOR THE REPROCESSING, SEPARATELY OR IN ANY COMBINATION, OF SINGLE OR MULTIPLE SPENT-FUEL BATCHES FROM ONE OR MORE REGIONS HAVING THE SAME OR DIFFERENT FINAL ENRICHMENTS. THUS, THE LOWEST COST SPENT-FUEL MANAGEMENT PROGRAM CAN BE READILY DETERMINED.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED NOVEMBER 1964.
   IBM7090 VERSION SUBMITTED JUNE 1964, REPLACED BY IBM360 VERSION JULY 1974.
   CDC6600 VERSION SUBMITTED APRIL 1973.

9. STATUS (CONTINUED)
IBM360 VERSION SUBMITTED JULY 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCE - J. T. JACKMAN, GUIDE TO NUCLEAR POWER COST EVALUATION, TID-7025, APRIL 30, 1963.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.3 (CDC6600), OS/360,370 (IBM360,370).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE -
SOURCE DECKS (6600-1446 CARDS, 360-1353 CARDS)
SAMPLE PROBLEMS (6600-136 CARDS, 360-137 CARDS)
REFERENCE REPORT, APPENDIX A

17. CATEGORY - D
KEYWORDS - FUEL CYCLE ECONOMICS, PERFORMANCE

ACC ABSTRACT 262 04/75

1. NAME OR DESIGNATION OF PROGRAM - MACH1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC3600,6500, IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - MACH1 PERFORMS ONE-DIMENSIONAL MULTIGROUP DIFFUSION SOLUTIONS AND ASSOCIATED CALCULATIONS, INCLUDING CRITICALITY SEARCHES, PERTURBATION, REACTION SUMMARY, BETA EFFECTIVE, GROUP COLLAPSING, AND POINTWISE REACTION RATES AND RATIOS. SEVERAL CARD DUMPS OF COMPUTED DATA ARE AVAILABLE ON OPTION. A SPECTRAL SYNTHESIS OPTION IS AVAILABLE IN THE IBM VERSION.

4. METHOD OF SOLUTION - THE DIFFUSION EQUATION SOLUTION METHOD IS THE SAME AS THAT IN AIM6 (ACC ABSTRACT 29). PERTURBATION AND EFFECTIVE BETA ROUTINES HAVE BEEN ADAPTED FROM DEL AND 1188/RE. REMAINING COMPUTATIONS CONSIST OF STRAIGHTFORWARD DATA MANIPULATION.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   20 SPATIAL REGIONS
   150 MESH POINTS
   30 ENERGY GROUPS (3600 VERSION ONLY)
   28 ENERGY GROUPS (6500 AND IBM360 VERSIONS)
   5 MODAL SPECTRA (IBM 360 VERSION)
   15 DOWNSCATTER GROUPS
   20 ISOTOPES PER PROBLEM
   20 HOMOGENIZED MATERIALS
   20 ISOTOPES PER HOMOGENIZED MATERIAL
   A SPECIAL SCATTER TREATMENT IS USED WHICH ALLOWS FULL DOWNSCATTER FOR HYDROGEN ISOTOPES.

6. TYPICAL RUNNING TIME - RUNNING TIME IS STRONGLY DEPENDENT ON THE TYPE OF PROBLEM AND QUALITY OF INITIAL GUESS. A K-CALCULATION OF A WATER-MODERATED SYSTEM WITH 16 GROUPS, 5 DOWNSCATTER GROUPS, 20 REGIONS, AND 130 MESH POINTS, WITH A CONSTANT INITIAL SOURCE GUESS CONVERGED IN 11 INNER ITERATIONS TO WITHIN 10**-5(DELTAK/K) IN 46.5 SECONDS. A COMPOSITION SEARCH ON A FAST REACTOR CORE USING 22 GROUPS, 12 DOWNSCATTERS, 9 REGIONS, 150 MESH POINTS, AND REGION-DEPENDENT INITIAL SOURCE GUESS, CONVERGED WITH A TOTAL OF 19 INNER ITERATIONS AND 3 TRIALS TO 10**-6(DELTAK/K), FOUND THE ADJOINT SOLUTION TO THE SAME ACCURACY AND RAN A SINGLE PERTURBATION PASS IN 144.9 SECONDS. THE IBM TEST WITHOUT OVERLAYS TOOK 6 SECONDS OF CPU TIME ON THE MODEL 195.

7. UNUSUAL FEATURES OF THE PROGRAM - THE PROGRAM WAS DESIGNED FOR USE ON FAST REACTOR SURVEY COMPUTATIONS AND AS A SUPPORTING UTILITY FOR MORE COMPLEX PROGRAMS. WIELANDT'S METHOD CAN BE USED IN CONJUNCTION WITH THE SPECTRAL SYNTHESIS OPTION TO GREATLY ACCELERATE EIGENVALUE CONVERGENCE. PROBLEMS CAN BE RUN IN SEQUENCE WITH ONLY REQUIRED DATA CHANGES AS INPUT FOR PROBLEMS AFTER THE FIRST. THE PROGRAM CONTAINS A CALL TO A NON-EXISTENT OVERLAY. THIS CAN PROVIDE A LINK TO ANY ROUTINE WRITTEN BY THE USER FOR MODIFICATION

7. UNUSUAL FEATURES OF THE PROGRAM (CONTINUED)
OR MANIPULATION OF MACH1 OUTPUT DATA. THE ROUTINE HAS ACCESS TO INPUT DATA AND DATA GENERATED BY THE CODE, AND CAN CONTROL LATER PROBLEMS THROUGH OPTION SWITCHES. MICROSCOPIC CROSS SECTIONS MAY BE CALLED FROM A LIBRARY OR INPUT AT RUN TIME. INDIVIDUAL CROSS SECTION QUANTITIES MAY BE MODIFIED TEMPORARILY FOR A PROBLEM.

8. RELATED AND AUXILIARY PROGRAMS - AIM6, DEL, AND 1188/RE WERE ADAPTED AND MODIFIED TO MAKE UP THE MAJOR PORTIONS OF THE PROGRAM.

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1967.
CDC3600 VERSION SUBMITTED DECEMBER 1966.
CDC6500 VERSION SUBMITTED MARCH 1969.
IBM360 VERSION SUBMITTED JANUARY 1973, SAMPLE PROBLEM EXECUTED BY ACC ON IBM370/195.

10. REFERENCES - D. A. MENELEY, L. C. KVITEK, AND D. M. OSHEA, MACH 1, A ONE-DIMENSIONAL DIFFUSION THEORY PACKAGE, ANL-7223, JUNE 1966.
D. MENELEY, MACH1 GUIDE AND MACH1 DICTIONARY, ANL-RP MEMORANDA, JUNE 1967.
WILLIAM G. PRICE, MACH/360, UNIVERSITY OF MICHIGAN INFORMAL DOCUMENTATION, 1972.
H. P. FLATT AND D. C. BALLER, THE AIM-6 CODE, NAA PROGRAM DESCRIPTION, JANUARY 1961.
L. C. KVITEK, DEL, A PERTURBATION PROGRAM WRITTEN IN FORTRAN, ANL-7052, JUNE 1965.
L. C. KVITEK, MULTIGROUP CALCULATIONS OF EFFECTIVE DELAYED-NEUTRON FRACTIONS, PROMPT NEUTRON LIFETIME, AND RELATED KINETICS PARAMETERS, IBM-704 PROGRAM 1188/RE, ANL-6511, MARCH 1962.

11. MACHINE REQUIREMENTS - CDC 3600 WITH 64K CORE STORAGE AND 9 TAPE DRIVES (INCLUDING 5 SYSTEM TAPES). IBM360 WITH 5 TAPE DRIVES AND 1645K CORE STORAGE ASSUMING NO OVERLAY ORGANIZATION.

12. PROGRAMMING LANGUAGES USED - 3600 FORTRAN (CDC3600), FORTRAN IV (CDC6500, IBM360-98%), BAL (IBM360-2%)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - CDC3600 SCOPE-SATCOPS II, IBM360 OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE PROGRAM CAN BE DIVIDED INTO SIX OVERLAYS WITH A TOTAL OF ELEVEN SEGMENTS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (MACH1 3600-6980 CARDS, 6500-7105 CARDS, 360-7661 CARDS, RXMACH 3600-137 CARDS, MACHLIB3 6500-479 CARDS, 360-509 CARDS)
OBJECT DECKS (MACH1 360-4100 CARDS)
SAMPLE PROBLEMS (MACH1 3600-95 CARDS, 6500-40 CARDS, 360-32 CARDS)
LIBRARY (MACHLIB3 6500-2145 CARDS, 360-2081 CARDS)
CONTROL INFORMATION (360 JCL-50 CARDS)
REFERENCE REPORT, ANL-7223, ANL-RP MEMORANDA, AND FOR THE IBM360 VERSION, MACH 360 DOCUMENT

17. CATEGORY - C
KEYWORDS - DIFFUSION EQUATIONS, 1-DIMENSIONAL, MULTIGROUP, SLABS, CYLINDERS, SPHERES, CRITICALITY SEARCHES, REACTION RATES, AVERAGES, PERTURBATION THEORY

1. NAME OR DESIGNATION OF PROGRAM - PDQ7

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600, IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - PDQ7 SOLVES FEW-GROUP NEUTRON DIFFUSION-DEPLETION PROBLEMS IN ONE, TWO, AND THREE DIMENSIONS. ADJOINT SOLUTIONS ARE ALSO AVAILABLE AND TWO OVERLAPPING THERMAL GROUPS MAY BE USED IN ONE AND TWO-DIMENSIONAL PROBLEMS. EITHER POINTWISE OR REGIONWISE DEPLETION MAY BE PERFORMED USING THE HARMONY DEPLETION SYSTEM. THE GEOMETRY MAY BE RECTANGULAR, CYLINDRICAL, OR SPHERICAL IN ONE DIMENSION, RECTANGULAR, CYLINDRICAL, OR HEXAGONAL IN TWO DIMENSIONS, AND RECTANGULAR OR HEXAGONAL IN THREE DIMENSIONS. ALL GEOMETRIES PROVIDE FOR VARIABLE MESH SPACING IN ALL DIMENSIONS. ZERO FLUX, ZERO CURRENT, AND ROTATIONAL SYMMETRY BOUNDARY CONDITIONS ARE AVAILABLE, AND BOUNDARY VALUE PROBLEMS MAY BE SOLVED BY SPECIFYING THE FLUX VALUES ON ONE OR MORE BOUNDARIES. THE BETTIS REVISED PDQ7 MAY BE USED TO ALSO SOLVE ADDITIVE FAST-SOURCE AND SIMPLIFIED PL PROBLEMS AS WELL AS THE THREE-DIMENSIONAL SYNTHESIS EIGENVALUE PROBLEM. CONTROL SEARCHES, THERMAL FEEDBACK, AND XENON FEEDBACK ARE OPTIONAL. THE IBM360 AND VERSION CAN BE USED TO SOLVE THREE-DIMENSIONAL SYNTHESIS PROBLEMS.

4. METHOD OF SOLUTION - DIFFERENCE EQUATIONS ARE OBTAINED AT EACH POINT BY INTEGRATING THE DIFFERENTIAL EQUATIONS OVER AN APPROPRIATE MESH ELEMENT. THE RESULTING EQUATIONS ARE THREE-POINT, FIVE-POINT, AND SEVEN-POINT IN ONE, TWO, AND THREE DIMENSIONS EXCEPT FOR HEXAGONAL GEOMETRY, WHERE THE NUMBER OF POINTS IS INCREASED BY TWO. THE GROUP EQUATIONS ARE SOLVED USING A SINGLE-LINE CYCLIC CHEBYSHEV SEMI-ITERATIVE TECHNIQUE AND THE SOURCE ITERATIONS ARE ACCELERATED BY A PROCEDURE BASED ON CHEBYSHEV POLYNOMIALS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE TOTAL NUMBER OF GROUPS IS LIMITED TO 5. THE PRODUCT OF GROUPS AND POINTS CANNOT EXCEED 300,000 AND THE PLANE SIZE IN THREE-DIMENSIONAL PROBLEMS IS RESTRICTED TO 8000 POINTS. FOR THE BETTIS REVISED PDQ7 SIX EQUATIONS MAY BE SOLVED WHEN THE FAST GROUP TREATMENT IS SIMPLIFIED P3. THERE ARE VERY FEW FIXED CONSTRAINTS ON SPATIAL PROBLEM SIZES. THE BETTIS REVISED PDQ7 HAS SUCCESSFULLY RUN EXPLICIT THREE-DIMENSIONAL PROBLEMS UP TO ABOUT 800,000 GROUP POINTS. THREE-DIMENSIONAL SYNTHESIS PROBLEMS UP TO 15,000,000 GROUP POINTS HAVE ALSO BEEN EXECUTED SUCCESSFULLY.

6. TYPICAL RUNNING TIME - THE RUNNING TIME IN HOURS MAY BE ESTIMATED BY DIVIDING THE PRODUCT OF GROUPS AND POINTS BY 150000. THE ACTUAL TIME MAY VARY WIDELY FROM THIS ESTIMATE DUE EITHER TO SPECIAL CONVERGENCE DIFFICULTIES OR TO THE COMPLEXITY OF THE DEPLETION FORMULATION. SAMPLE PROBLEM RUNNING TIME ON THE 360/195 IS ABOUT 4 MINUTES.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - HARMONY TABLE SETS MAY BE INPUT ON CARDS OR MAY BE OBTAINED FROM A FILE GENERATED BY A CROSS SECTION PROGRAM. ON REQUEST, PDQ7 WILL PREPARE OUTPUT FILES CONTAINING FLUX, CONCENTRATION, POWER, INTEGRAL, GEOMETRY, AND SYNTHESIS INTEGRAL DATA, AND THESE FILES MAY BE FURTHER PROCESSED IN AUXILIARY PROGRAMS. THE BETTIS VERSION OF PDQ7 USES THE NEW BETTIS ENVIRONMENTAL ROUTINES, WHICH HAVE NOT YET BEEN RELEASED. THE B&W VERSION USES THE B&W VERSION OF THE BETTIS ENVIRONMENTAL ROUTINES (ACC ABSTRACT 478).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1967.
CDC6600 (BETTIS) VERSION SUBMITTED MAY 1967, REPLACED BY UPDATED EDITION JUNE 1971.
IBM360 (IBM) VERSION SUBMITTED FEBRUARY 1969, DELETED NOVEMBER 1971.
CDC6600 (B&W) VERSION SUBMITTED FEBRUARY 1970.
IBM360 (AEROJET NUCLEAR) VERSION 360B SUBMITTED APRIL 1970, REVISED (C) APRIL 1971, REPLACED BY THIRD REVISION (D) AUGUST 1972, REVISED (E) MARCH 1973, REVISED (F) MARCH 1974, SAMPLE PROBLEM EXECUTED BY ACC.
CDC6600 KRONOS (BOEING) VERSION SUBMITTED JULY 1973.

10. REFERENCES - W. R. CADWELL, PDQ-7 REFERENCE MANUAL, WAPD-TM-678, JANUARY 1967.

R. J. BREEN, O. J. MARLOWE, AND C. J. PFEIFER, HARMONY - SYSTEM FOR NUCLEAR REACTOR DEPLETION COMPUTATION, WAPD-TM-478, JANUARY 1965.

OUTPUT FOR THE BETTIS CDC-6600 REVISED VERSION OF PDQ7, 1971.

C. J. PFEIFER, PDQ-7 REFERENCE MANUAL II, WAPD-TM-947(L), FEBRUARY 1971.

C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1967.

INSTALLATION OF PDQ-7 ON THE CDC 6600 IN CONJUNCTION WITH MODEL, CDC NOTE, 1971.

A. W. BROWN, J. A. MCCLURE, AND R. J. WAGNER, SUMMARY OF PDQ-7 (IBM-360-370 VERSION) INPUT DATA REQUIREMENTS AND OPERATING PROCEDURES, ANCR-1061, MARCH 1972.

PDQ-7 TRANSMITTAL TAPE (ACC NO. 275.360D), ANC NOTE, 1972.

R. J. WAGNER, OPERATIONAL NOTES FOR PDQ-7/14, ACC NO. 275.360D, ANC NOTE, 1972.

UPD, A PROGRAM TO UPDATE SOURCE DECKS, ANC NOTE PU1750.

NRTS ENVIRONMENTAL SUBROUTINE MANUAL, ANC DOCUMENT, DECEMBER 1972.

PDQ7, ACC NO. R275.6600D, ARGONNE CODE CENTER PROGRAMMING NOTE 74-16, DECEMBER 3, 1973.

11. MACHINE REQUIREMENTS - THE CENTRAL MEMORY SIZE FOR THE BETTIS VERSION MUST BE AT LEAST 64K AND THERE MUST BE FOUR NON-SYSTEM DISKS, EACH ON ITS OWN CHANNEL. THE 360 VERSION REQUIRES AT LEAST 400K BYTES OF CORE AND MODEL 2314 OR 3330 DISK PACKS.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASCENT (6600), FORTRAN IV(H) AND BAL (360)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.0 (BETTIS REV.), SCOPE 3.1.6 (B&W 6600), OS/360(360), AND KRONOS 2.0 (BCS 6600).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE REQUIRED SOFTWARE ENVIRONMENT IS DESCRIBED IN REFERENCE 5. IT INCLUDES ROUTINES FOR PROGRAM LOADING, INPUT CONVERSION AND PROCESSING, STORAGE AND RETRIEVAL OF PERMANENT FILES, SCRATCH INPUT/OUTPUT, AND STORAGE ALLOCATION. CALL REMARK IN SUBROUTINE CASENN REFERS TO A 6600 SYSTEM ROUTINE FOR DISPLAY OF MESSAGES ON THE OPERATOR SCOPE. CALL TICK REFERS TO A 6600 SYSTEM ROUTINE FOR LOGGING JOB TIME USED. SUBSTITUTE ROUTINES WILL BE REQUIRED FOR USE OF THIS PROGRAM ON OTHER MACHINES.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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6600 KRONOS F. M. KNOX
BOEING COMPUTER SERVICES, INC.
P. O. BOX 24346
SEATTLE, WASHINGTON 98124

16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL (BETTIS 6600-3 TAPES, B&W 6600-2 TAPES, AEROJET 360-1 TAPE, BCS 6600-1 TAPE)
SOURCE DECKS (BETTIS 6600-51,497 CARDS, B&W 6600-27,446 CARDS, AEROJET 360-38,268 CARDS)
UPDATE FILES (BOEING UPDATE OLDPL OF PDQ7 6600-238 RECORDS, UPDATE OLDPL OF BETTIS ENVIRONMENTAL ROUTINES 6600-130 RECORDS, MODIFY OPL OF PDQ,MFN,CATLIST 6600-20 RECORDS)
IBM 2314 LOAD MODULE (AEROJET PDS PDQTRNMT 360-1856 BLOCKS)
SAMPLE PROBLEMS (BETTIS 6600-80 CARDS, AEROJET 360-761 CARDS, B&W 6600-69 CARDS)
AUXILIARY PROGRAMS (AEROJET BUFR 246 CARDS, PDQDI 41 CARDS, PDQD 148 CARDS, PDQR 107 CARDS, PDQTL 53 CARDS, MISCELLANEOUS 3135 CARDS)
FLUX FILES (AEROJET 360-137 BLOCKS)
SAMPLE PROBLEM OUTPUT LISTINGS (BETTIS 6600-36 PAGES, AEROJET 360-89 PAGES)
REFERENCE REPORTS, WAPD-TM-678, WAPD-TM-668, WAPD-TM-947(L), ANCR-1061, NRTS MANUAL, AND NOTES

17. CATEGORY - D
KEYWORDS - DEPLETION, DIFFUSION EQUATIONS, 1-DIMENSIONAL, SLABS, CYLINDERS, SPHERES, 2-DIMENSIONAL, HEXAGONAL, X-Y, R-Z, 3-DIMENSIONAL, X-Y-Z, SYNTHESIS, FEW-GROUP, SEARCHES, HARMONY CODES, UPD CODES, BUFR CODES, PDQDI CODES, PDQD CODES, PDQR CODES, PDQTL CODES

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL (4 TAPES)
SOURCE DECKS (GGC4 1108-11,567 CARDS, WTFG 1646 CARDS, MAKE 1033 CARDS, MST 463 CARDS, PRINT 769 CARDS, MIXER 500 CARDS, MGT3 251 CARDS, SPRINT 334 CARDS, COMBIN 479 CARDS, DOP 927 CARDS, CCC4 6600-11,504 CARDS)
SAMPLE PROBLEMS (GGC4 1108-38 CARDS, 6600-38 CARDS)
FAST DATA TAPE (60 NUCLIDES - TAPE 2 - 1108-2772 BINARY RECORDS, 6600-1703 BINARY RECORDS)
FAST DATA TAPE (151 NUCLIDES - TAPE 3 - 1108-7362 BINARY RECORDS, 6600-4436 BINARY RECORDS)
THERMAL DATA TAPE (222 NUCLIDES - TAPE 4 - 1108-2854 BINARY RECORDS, 6600-1539 BINARY RECORDS)
REFERENCE REPORTS AND NOTES

17. CATEGORY - B
KEYWORDS - MULTIGROUP CROSS SECTIONS, AVERAGES, FAST, THERMAL, SPECTRA, DOPPLER BROADENING, DANCOFF CORRECTION, ANGULAR DISTRIBUTION, RESONANCE PARAMETERS, MAKE CODES, MST CODES, PRINT CODES, MIXER CODES, WTFG CODES, MGT3 CODES, SPRINT CODES, COMBIN CODES, DOP CODES

1. NAME OR DESIGNATION OF PROGRAM - LION4

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600,7600, UNIVAC1108

3. DESCRIPTION OF PROBLEM OR FUNCTION - LION4 IS A COMPUTER PROGRAM FOR CALCULATING ONE-, TWO-, OR THREE-DIMENSIONAL TRANSIENT AND STEADY-STATE TEMPERATURE DISTRIBUTIONS IN REACTOR AND REACTOR PLANT COMPONENTS. IT IS USED PRIMARILY FOR THERMAL-STRUCTURAL ANALYSES. IT UTILIZES FINITE DIFFERENCE TECHNIQUES WITH FIRST-ORDER FORWARD DIFFERENCE INTEGRATION AND IS CAPABLE OF HANDLING A WIDE VARIETY OF BOUNDING CONDITIONS.
   HEAT TRANSFER SITUATIONS ACCOMMODATED INCLUDE FORCED AND FREE CONVECTION IN BOTH REDUCED AND FULLY-AUTOMATED TEMPERATURE DEPENDENT FORMS, COOLANT FLOW EFFECTS, A LIMITED THERMAL RADIATION CAPABILITY, A STATIONARY OR STAGNANT FLUID GAP, A DUAL DEPENDENCY (TEMPERATURE DIFFERENCE AND TEMPERATURE LEVEL) HEAT TRANSFER, AN ALTERNATIVE HEAT TRANSFER MODE COMPARISON AND SELECTION FACILITY COMBINED WITH HEAT FLUX DIRECTION SENSOR, AND ANY FORM OF TIME-DEPENDENT BOUNDARY TEMPERATURES. THE PROGRAM, WHICH HANDLES TIME AND SPACE DEPENDENT INTERNAL HEAT GENERATION, CAN ALSO PROVIDE TEMPERATURE DEPENDENT MATERIAL PROPERTIES WITH LIMITED NON-ISOTROPIC PROPERTIES. USER-ORIENTED CAPABILITIES AVAILABLE INCLUDE TEMPERATURE MEANS WITH VARIOUS WEIGHTINGS AND A COMPLETE HEAT FLOW RATE SURVEILLANCE SYSTEM.

4. METHOD OF SOLUTION - THE MODELING IS BASED ON THE CONCEPT OF NODAL POINTS CONNECTED BY ONE-DIMENSIONAL THERMAL CONDUCTANCE EQUATIONS IN AS MANY AS SIX DIRECTIONS SIMULTANEOUSLY. THE EXPLICIT, OR FIRST FORWARD DIFFERENCE METHOD, IS THEN USED TO OBTAIN THE SOLUTIONS TO THESE EQUATIONS FOR THE THREE-DIMENSIONAL FIELD. THE TEMPERATURE CHANGE FOR A SURFACE NODE IS CALCULATED BY APPLYING THE OHM'S LAW ANALOGY FOR HEAT FLOW TO A NODE WITH NO CAPACITANCE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - DYNAMIC ALLOCATION
   11*D1 + 26*D2 + 20*D3 + 3*D4 + 17*D5 + 3*D6 + S1 + S2 + S3 + S4
   LESS THAN OR EQUAL TO 24500
      VARIABLE NUMBER OF EXTERNAL CONNECTIONS (D1)
      VARIABLE NUMBER OF INTERNAL NODES (D2)
      VARIABLE NUMBER OF SURFACE NODES (D3)
      VARIABLE NUMBER OF BOUNDARY NODES (D4)
      VARIABLE NUMBER OF COOLANT NODES (D5)
      VARIABLE NUMBER OF INTERFACE NODES (D6)
      S1=STORAGE FOR TEMPERATURE MEANS AND DIFFERENCES
      S2=STORAGE FOR HEAT FLOW SUBROUTINE
      S3=STORAGE FOR CONVECTIVE HEAT TRANSFER CALCULATION
      S4=STORAGE FOR VARIABLE LIBRARIES
   USING INCREASED NODAL CAPABILITY FEATURE WITH ADMITTANCE MATRIX IN FCS THIS ALGORITHM BECOMES--
   11*D1 + 10*D2 + 4*D3 + 3*D4 + 17*D5 + 3*D6 + S1 + S2 + S3 + S4
      15 MATERIALS
      7*D2 INTERNAL CONNECTIONS

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM (CONTINUED)
   12 COOLANT CHANNELS (EACH WITH 4 SIDES MAXIMUM)
   77 PRINTOUTS
   7 INTERNAL CONNECTIONS PER INTERNAL NODE
   6 SURFACE CONNECTIONS PER SURFACE NODE
   6 TYPES OF TEMPERATURE MEANS AND DIFFERENCES SETS
   10 GRAPHS (CDC6600,7600 ONLY)
   12 CURVES PER GRAPH (CDC6600,7600 ONLY)
   17 TYPES OF QUANTITIES GRAPHABLE (CDC6600,7600 ONLY)
   4 SUB-COOLED NUCLEATE BOILING REGIONS
   5 TYPES OF HEAT FLOW RATE SETS

6. TYPICAL RUNNING TIME - THE RUNNING TIME ON THE CDC6600 IS STRONGLY DEPENDENT ON THE NUMBER OF NODES, THEIR RELATIVE AND ABSOLUTE SIZE, AND THE TIME RANGE CONSIDERED. THE SAMPLE PROBLEM EXECUTES IN ONLY A FEW SECONDS ON THE CDC6600. EXECUTION OF THE UNIVAC1108 SAMPLE PROBLEM REQUIRES 5 SECONDS.

7. UNUSUAL FEATURES OF THE PROGRAM - SUBCOOLED NUCLEATE BOILING MAY BE CONSIDERED. HOWEVER, THIS CONSIDERATION IS LIMITED TO WATER.

8. RELATED AND AUXILIARY PROGRAMS - SUPPORT PROGRAMS INCLUDE THE PLI SERIES OF PREPROCESSORS FOR SELECTED GEOMETRIES, THE GRAPL GRADIENT PLOTTER, HCAL2, WHICH EVALUATES HEAT TRANSFER COEFFICIENT EQUATIONS FOR SELECTED CONDITIONS, AND CONLI, WHICH RENUMBERS INPUT DATA AND INSERTS SPARE NODE NUMBERS OF 3 DIFFERENT KINDS TO PERMIT CONSOLIDATION OF GEOMETRY INPUT FOR ENTRY INTO A LARGE PROBLEM. LION SUPERCEDES EARLIER IBM704 AND PHILCO 2000 PROGRAMS CALLED TIGER. LION USES THE PLOTTING ROUTINES IN KAPLPLOT (ACC ABSTRACT 496).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1967.
   CDC6600 VERSION SUBMITTED OCTOBER 1967, REPLACED BY FIRST REVISION AUGUST 1968, REPLACED BY SECOND REVISION JANUARY 1970, REPLACED BY LION4 JULY 1973, PLOTTING ROUTINES REPLACED SEPTEMBER 1974.
   UNIVAC1108 VERSION SUBMITTED JUNE 1971.

10. REFERENCES - J. R. SCHMID, G. L. LECHLITER, AND W. W. FISCHER, LION TEMPERATURE DISTRIBUTIONS FOR ARBITRARY SHAPES AND COMPLICATED BOUNDARY CONDITIONS, KAPL-M-6532, JULY 27, 1966.
W. W. FISCHER, LION TALES A USERS MANUAL FOR THE LION THERMAL-STRUCTURAL EVALUATION CODE, KAPL-M-6533, JULY 31, 1967.
E. J. BINNEY, ADDITIONS TO LION CODE, KAPL NOTE, SEPTEMBER 30, 1969.
E. J. BINNEY, ADDITIONS TO LION CODE EFFECTIVE WITH SEPTEMBER 1970 VERSION, KAPL NOTE, SEPTEMBER 22, 1970.
W. W. FISCHER AND M. N. GOLDSMITH, GRAPL A GRADIENT PLOTTER FOR LION, KAPL-M-7164(L), OCTOBER 13, 1970.
E. J. BINNEY, ADDITIONS TO LION CODE EFFECTIVE WITH THE DECEMBER 1970 VERSION, KAPL NOTE, DECEMBER 18, 1970.
E. J. BINNEY, ADDITIONS TO THE LION CODE EFFECTIVE FEBRUARY 26, 1971, KAPL NOTE, FEBRUARY 26, 1971.

10. REFERENCES (CONTINUED)

E. J. BINNEY, MODIFICATION TO THE LION CODE EFFECTIVE MARCH 31, 1971, KAPL NOTE, APRIL 8, 1971.

E. J. BINNEY, HEAT BALANCE CAPABILITY IN LION, KAPL NOTE, APRIL 30, 1971.

E. J. BINNEY, ADDITIONS TO THE LION CODE EFFECTIVE FEBRUARY 29, 1972, KAPL NOTE, FEBRUARY 29, 1972.

E. J. BINNEY, LION NEWSLETTER NO. 1, KAPL NOTE, JUNE 5, 1972.

E. J. BINNEY, LION4 NEWSLETTER NO. 2, KAPL NOTE, OCTOBER 5, 1972.

M. N. GOLDSMITH AND W. W. FISCHER, THE FLI--SERIES OF PREPROCESSORS FOR THE LION CODE, KAPL-M-7289(L), JULY 6, 1972.

JPARAM SYSTEMS PROGRAMMING INFORMAL PROGRAM DESCRIPTION, EXCERPT FROM USERS GUIDE TO CDC SYSTEMS AT KAPL, JULY 27, 1972.

W. W. FISCHER, CONVECTIVE HEAT TRANSFER COEFFICIENT CALCULATIONAL SYSTEM FOR LION, KAPL-M-7301(L), DECEMBER 18, 1972.

KAPL INTERNAL CALCOMP SUBROUTINES, KAPL NOTE, MARCH 31, 1971.

11. MACHINE REQUIREMENTS - THE PLOTTER ROUTINE APPLE IS USED TO PRODUCE THE INPUT REQUIRED BY THE ASSOCIATED CALCOMP PLOTTER FOR GRAPHICAL OUTPUT.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASCENT (CDC6600,7600), FORTRAN IV (UNIVAC1108)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE (CDC6600,7600) AND EXEC8 (UNIVAC1108).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - DATA SAVING ON TAPE AND OPTIONS TO PROVIDE PLOTTING OF A VARIETY OF PARAMETERS VERSUS TIME ARE INCLUDED IN LION4. BECAUSE OF THE LARGE SIZE OF LION4, IT WAS NECESSARY TO SEGMENT THE PROGRAM. THE UNIVAC1108 CON VERSION IS BASED ON THE JANUARY 1970 VERSION AND DOES NOT INCLUDE THE ADDED FEATURES OF THE RECENT KAPL EDITION NOR DOES IT INCLUDE A PLOTTING CAPABILITY.

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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL

16. MATERIAL AVAILABLE (CONTINUED)
    SOURCE DECKS (6600-6568 CARDS, 1108-2447 CARDS)
    SAMPLE PROBLEMS (6600-161 CARDS, 1108-156 CARDS)
    SAMPLE PROBLEM OUTPUT (6600-33 PAGES, 1108-22 PAGES)
    REFERENCE REPORTS, NEWSLETTERS, AND NOTES

17. CATEGORY - H
    KEYWORDS - TEMPERATURE DISTRIBUTION, FLUID FLOW, THERMAL, 3-DIMENSIONAL, HEAT TRANSFER, LIQUIDS, VAPORS, TIGER CODES

ACC ABSTRACT 300 03/72

1. NAME OR DESIGNATION OF PROGRAM - SAFE-CREEP

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - UNIVAC1108

3. DESCRIPTION OF PROBLEM OR FUNCTION - SAFE-CREEP PERFORMS A VISCO-ELASTIC ANALYSIS OF PLANE OR AXISYMMETRIC COMPOSITE CONCRETE STRUCTURES WITH AGE- AND TEMPERATURE-DEPENDENT CREEP DATA.

4. METHOD OF SOLUTION - THE PROGRAM USES THE FINITE ELEMENT METHOD WHICH REDUCES THE PROBLEM TO THE SOLUTION OF A SYSTEM OF COUPLED INTEGRAL EQUATIONS. THE METHOD OF SOLUTION IS ITERATIVE ON THE SPACE VARIABLE AND UTILIZES THE TRAPEZOIDAL RULE INTEGRATION FOR THE TIME VARIABLE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   350 NODES
   750 ELEMENTS
   60 TIME INCREMENTS

6. TYPICAL RUNNING TIME - 90 MINUTES ARE REQUIRED FOR A FULL-CAPACITY PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - GRDWRK (ACC ABSTRACT 296), SAFE-PORS (ACC ABSTRACT 250), SAFE-PLANE (ACC ABSTRACT 252), SAFE-SHELL (ACC ABSTRACT 253)

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1967.
   UNIVAC1108 VERSION SUBMITTED OCTOBER 1967.

10. REFERENCES - Y. RASHID AND W. ROCKENHAUSER, PRESSURE VESSEL ANALYSIS BY FINITE ELEMENT TECHNIQUE, GA-7810, 1967.
   R. D. BROWN, PROPERTIES OF CONCRETE IN REACTOR VESSELS, PAPER NO. 13, CONFERENCE ON PRESTRESSED CONCRETE PRESSURE VESSELS, LONDON, MARCH 13-17, 1967.
   F. J. DE ARRIAGA AND Y. R. RASHID, SAFE-CREEP, A COMPUTER PROGRAM FOR THE VISCOELASTIC ANALYSIS OF AXISYMMETRIC AND PLANE CONCRETE STRUCTURES, A USERS MANUAL, GA-8111, JULY 31, 1967.

11. MACHINE REQUIREMENTS - 65K MEMORY AND 13 TAPES

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED -

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - CALL TICKER REFERS TO AN 1108 SYSTEM ROUTINE FOR LOGGING JOB TIME USED. A SUBSTITUTE ROUTINE WILL BE REQUIRED FOR USE OF THIS PROGRAM ON ANOTHER MACHINE.

10. REFERENCES (CONTINUED)

NOTES ON TSN FOR THE IBM S/360, AI NOTE.

R. A. BLAINE, ATOMICS INTERNATIONAL ENVIRONMENT REPORT, MAY 1967.

W. W. ENGLE, JR., A USERS MANUAL FOR ANISN, A ONE-DIMENSIONAL DISCRETE ORDINATES TRANSPORT CODE WITH ANISOTROPIC SCATTERING, K-1693, MARCH 30, 1967.

M. A. BOLING AND W. A. RHOADES, ANISN/DTF II, CONVERSION TO IBM SYSTEM/360, AI-66-MEMO-171, APRIL 1967.

J. F. JACKSON, W. A. RHOADES, AND L. I. MOSS, ANALYSIS OF SNAPTRAN-1 AND -2 REACTOR KINETICS EXPERIMENTS, NAA-SR-11850, JUNE 26, 1967.

B. G. CARLSON AND K. D. LATHROP, TRANSPORT THEORY - THE METHOD OF DISCRETE ORDINATES, LAMS-3251-MS, OCTOBER 22, 1965.

11. MACHINE REQUIREMENTS - 32K IBM7094 OR IBM360, MODEL 50H OR LARGER

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND MAP (IBM7094), FORTRAN IV (IBM360)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - FIB III (IBM7094) OR OS/360 (IBM360).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - TSN USES THE AICRT3-3 ROUTINE (REFERENCE 2) AND THE NAA SC-4020 PACKAGE AVAILABLE THROUGH -

UAIDE LIBRARIAN
C/O STROMBERG-CARLSON
P. O. BOX 2449
SAN DIEGO, CALIFORNIA

THE USER CAN DELETE THE CRT FEATURE BY SUPPLYING DUMMY SUBROUTINES.

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (7094-2058 CARDS, 360-1909 CARDS)
SAMPLE PROBLEMS (7094-62 CARDS, 360-62 CARDS)
REFERENCE REPORT, NAA-SR-MEMO-12319, ENVIRONMENT REPORT, AND AI NOTE

17. CATEGORY - F
KEYWORDS - 2-GROUP, SN METHOD, SPACE-TIME KINETICS, TEMPERATURE COEFFICIENTS, FUELS EXPANSION, FEEDBACK, GRAPHS, 1-DIMENSIONAL, SNAP REACTORS, ANISN CODES

ACC ABSTRACT 310 04/75

1. NAME OR DESIGNATION OF PROGRAM - GAKIN2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM370

3. DESCRIPTION OF PROBLEM OR FUNCTION - GAKIN2 SOLVES THE TIME-DEPENDENT MULTIGROUP NEUTRON DIFFUSION EQUATIONS IN ONE SPACE DIMENSION.

4. METHOD OF SOLUTION - THE SPACE DIMENSION IS TREATED USING THE CONVENTIONAL FINITE DIFFERENCE APPROXIMATION. TIME INTEGRATION IS ACCOMPLISHED USING AN EXPONENTIAL TRANSFORMATION AND SEMI-IMPLICIT DIFFERENCING. THE RESULTING EQUATIONS ARE SOLVED BY FIRST PREDICTING THE FREQUENCY FOR THE TIME TRANSFORMATION AND THEN CORRECTING THE SOLUTION BY SOLVING THE FULL SET OF EQUATIONS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - VARIABLE DIMENSIONING PERMITS ACCOMMODATION OF ANY NUMBER OF ENERGY GROUPS, SPACE POINTS, AND MATERIAL REGIONS, WITHIN THE LIMITS OF STORAGE AVAILABLE. THE NUMBER OF DELAYED NEUTRON GROUPS IS LIMITED TO 6. THE NUMBER OF BYTES OF CORE STORAGE CAN BE APPROXIMATED BY

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100,000 + 8(P(G+D) + 2GD + 9G + G(G+1) + 26R
    + 19RG + RG**2 + 11P + 4PG + 2N + 50)
```

WHERE
- R IS THE NUMBER OF REGIONS,
- G IS THE NUMBER OF NEUTRON GROUPS,
- D IS THE NUMBER OF DELAYED GROUPS,
- P IS THE NUMBER OF SPACE POINTS, AND
- N IS THE NUMBER OF TEST POINTS FOR TESTING CONVERGENCE AND PREDICTING TRANSFORMATION FREQUENCIES (RECOMMENDED VALUE IS ONE OR TWO TIMES THE NUMBER OF MATERIAL REGIONS, R).

6. TYPICAL RUNNING TIME - COMPUTATION TIME PER PROBLEM TIME-STEP IS ROUGHLY APPROXIMATED BY (2 * 10**(-4)) * (P(G + .3D)), WHERE P, G, AND D ARE DEFINED AS IN 5 ABOVE.

7. UNUSUAL FEATURES OF THE PROGRAM - GAKIN2 PERMITS AN ARBITRARILY LARGE NUMBER OF NEUTRON GROUPS.

8. RELATED AND AUXILIARY PROGRAMS - GAKIN2 IS A REVISION OF THE ORIGINAL GAKIN CODE WITH IMPROVED TEMPORAL TREATMENT.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1968.
   UNIVAC1108 VERSION OF GAKIN SUBMITTED NOVEMBER 1967, DELETED DECEMBER 1974.
   IBM370 VERSION OF GAKIN2 SUBMITTED DECEMBER 1974, SAMPLE PROBLEMS EXECUTED BY ACC.

10. REFERENCES - J. H. MASON AND K. F. HANSEN, GAKIN II, A ONE-DIMENSIONAL MULTIGROUP DIFFUSION THEORY REACTOR KINETICS CODE, MITNE-151, AUGUST 1973.
K. F. HANSEN AND S. R. JOHNSON, GAKIN, A ONE-DIMENSIONAL MULTIGROUP KINETICS CODE, GAMD-7543, AUGUST 1967.

11. MACHINE REQUIREMENTS - 184K BYTES OF CORE ON AN IBM370/165

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECK (2563 CARDS)
    SAMPLE PROBLEMS (122 CARDS)
    REFERENCE REPORT, MITNE-151

17. CATEGORY - F
    KEYWORDS - 1-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS, MULTI-GROUPS, SLABS, CYLINDERS, SPHERES, GAKIN CODES

ACC ABSTRACT 311 03/72

1. NAME OR DESIGNATION OF PROGRAM - BURNUP

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - GE635

3. DESCRIPTION OF PROBLEM OR FUNCTION - BURNUP CORRELATES HEAVY ELEMENT ISOTOPIC ANALYSIS WITH FISSION PRODUCT NEODYMIUM, URANIUM, AND PLUTONIUM CONCENTRATIONS IN AN IRRADIATED URANIUM FUEL FOR CALCULATION OF BURNUP (ATOM PER CENT FISSION AND MWD/MT). REACTOR PARAMETERS, INCLUDING EFFECTIVE NEUTRON ABSORPTION CROSS SECTIONS FOR ALL URANIUM AND PLUTONIUM ISOTOPES, CAPTURE-TO-FISSION RATIOS FOR U235, PU239, AND PU241, A TWO-GROUP DESCRIPTION OF THE NEUTRON SPECTRUM, THE AVERAGE NEUTRON TEMPERATURE, THE REACTOR FAST FISSION FACTOR, AND THE DISTRIBUTION OF THE SOURCES OF FISSION AMONG THE FISSIONABLE NUCLIDES ARE COMPUTED FROM THE EXPERIMENTAL DATA OBTAINED FROM THE MASS SPECTROMETRIC ANALYSIS OF URANIUM, PLUTONIUM, AND NEODYMIUM.

4. METHOD OF SOLUTION - AN ITERATIVE PROCESS IS UTILIZED WHEREBY A CORRECTION FOR TRACES OF URANIUM CONTAMINATION AS WELL AS CORRECTIONS BASED ON EXPOSURE AND DECAY FACTORS ARE OBTAINED ON AN INITIAL PASS THROUGH THE DATA. THE LAST ITERATION USING THE CORRECTIONS OBTAINED GIVES A FINAL VALUE FOR THE CALCULATIONS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - A MAXIMUM OF 50 SAMPLES CAN BE RUN IN ANY ONE CASE. ALTHOUGH A SINGLE SAMPLE CAN BE PROCESSED, THE AVERAGING PROCEDURES FOR NUCLEAR CONSTANTS ARE MOST EFFECTIVE WHEN 5 TO 50 SAMPLES FROM THE SAME FUEL LOAD ARE POOLED IN A SINGLE CASE.

6. TYPICAL RUNNING TIME - 2 TO 3 SECONDS PER SAMPLE ARE REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1968.
GE635 VERSION SUBMITTED DECEMBER 1967.

10. REFERENCES - B. F. RIDER AND C. P. RUIZ, DETERMINATION OF ATOM PERCENT FISSION IN URANIUM FUEL, PROGRESS IN NUCLEAR ENERGY SERIES IX, ANALYTICAL CHEMISTRY 3, PART 2, C. E. CROUTHAMEL, ED., PERGAMON PRESS, 1962.

B. F. RIDER, J. PAUL PETERSON, JR., J. L. JAECH, C. P. RUIZ AND F. R. SMITH, ACCURATE NUCLEAR BURNUP ANALYSIS XV, GEAP-4950, SEPTEMBER 1965.

B. F. RIDER, C. P. RUIZ, J. P. PETERSON, JR., AND F. R. SMITH, BURNUP, A FORTRAN IV CODE FOR COMPUTING U AND PU FUEL BURNUP FROM U, PU, AND ND MASS SPECTROMETRIC MEASUREMENTS, GEAP-5355, OCTOBER 31, 1967.

1. NAME OR DESIGNATION OF PROGRAM - GANDY3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - UNIVAC1108

3. DESCRIPTION OF PROBLEM OR FUNCTION - GANDY3 EVALUATES TEMPERATURE-DEPENDENT EFFECTIVE NEUTRON CAPTURE, FISSION, AND SCATTERING CROSS SECTIONS IN THE UNRESOLVED RESONANCE REGION FROM AVERAGE RESONANCE PARAMETERS.

4. METHOD OF SOLUTION - EFFECTIVE CROSS SECTIONS ARE EVALUATED AT SPECIFIED ENERGIES AND TEMPERATURES USING THE NARROW RESONANCE APPROXIMATION AND ASSUMING ISOLATED RESONANCES. RESONANCE CROSS SECTIONS ARE TREATED ON A STATISTICAL BASIS, USING CHI-SQUARED DISTRIBUTIONS FOR THE PARTIAL WIDTHS. THE LINE SHAPE FUNCTIONS, PSI AND CHI, ARE EVALUATED IN A SUBROUTINE WRITTEN BY NALIBOFF WHICH IS BASED UPON A METHOD DEVELOPED BY ADLER AND NALIBOFF (SEE REFERENCE 3). THE STATISTICAL AVERAGING IS CARRIED OUT USING A QUADRATURE SCHEME INTRODUCED IN THE RAPTURE CODE (ACC ABSTRACT 176).

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - GANDY3 WILL HANDLE AS MANY TEMPERATURES AS DESIRED FOR A MAXIMUM OF 100 ENERGY POINTS. CONSIDERATION IS GIVEN TO NEUTRON ORBITAL ANGULAR MOMENTA THROUGH D-WAVE (L=2).

6. TYPICAL RUNNING TIME - FOR PU-239 WITH L=0 AND 1, THE DENOMINATOR EVALUATED, AND THE EXACT INTERFERENCE SCATTERING OPTION SELECTED, THE APPROXIMATE RUNNING TIME IS 2 SECONDS FOR ONE ENERGY POINT. NON-FISSIONABLE NUCLIDES, WHICH REQUIRE STATISTICAL AVERAGING ONLY FOR THE NEUTRON WIDTH DISTRIBUTION, ARE AN ORDER OF MAGNITUDE FASTER FOR THE SAME DEGREE OF APPROXIMATION. FOR REACTOR DESIGN CALCULATIONS IN WHICH UNRESOLVED RESONANCE CROSS SECTIONS ARE EVALUATED AT ONE-QUARTER LETHARGY INTERVALS, THE EFFECTIVE CROSS SECTIONS IN THE UNRESOLVED RESONANCE REGION FOR U-238, PU-239, PU-240, PU-241, AND PU-242 ARE EVALUATED BY GANDY3 AS IMPLEMENTED IN THE GGC5 CODE IN APPROXIMATELY 45 SECONDS.

7. UNUSUAL FEATURES OF THE PROGRAM - GANDY3 INCORPORATES THE FOLLOWING FEATURES WHICH DISTINGUISH THE PRESENT TREATMENT FROM EARLIER UNRESOLVED RESONANCE CALCULATIONS -
   (A) COMPUTATION OF THE UNRESOLVED RESONANCE SCATTERING CROSS SECTION AS WELL AS THE CAPTURE AND FISSION CROSS SECTIONS.
   (B) CONSIDERATION OF S-, P-, AND D-WAVE (L=0,1, AND 2) NEUTRON ORBITAL ANGULAR MOMENTA.
   (C) CONSIDERATION OF ARBITRARY HALF-INTEGER VALUES OF THE TARGET SPIN IN ADDITION TO I=0.
   (D) CALCULATION OF THE FISSION CROSS SECTIONS FOR CHI-SQUARED FISSION WIDTH DISTRIBUTIONS WITH ONE, TWO, THREE, OR FOUR DEGREES OF FREEDOM.
   (E) CONSIDERATION OF INTERFERENCE SCATTERING.
   (F) INCLUSION OF THE DENOMINATOR IN THE CALCULATION OF THE

7. UNUSUAL FEATURES OF THE PROGRAM (CONTINUED)
EFFECTIVE CROSS SECTION.
(G) INCLUSION OF A MUCH FASTER J FUNCTION EVALUATION ALGORITHM THAN THE ORIGINAL VERSION OF GANDY.
(H) INCLUSION OF AN OPTIONAL PROCEDURE FOR THE COMPUTATION AND PRINTING OF THE DIFFERENCES BETWEEN CROSS SECTION CALCULATIONS AT DIFFERENT TEMPERATURES.
(I) ADOPTION OF THE ENDF/B FORMAT CONVENTIONS WITH RESPECT TO THE COMPUTATION OF THE REDUCED NEUTRON WAVE LENGTH AND THE NEUTRON PENETRABILITIES.

8. RELATED AND AUXILIARY CODES - GANDY3 IS AN EXTENSION OF THE GANDY CODE WHICH WAS BASED UPON THE RAPTURE CODE. GANDY3 IS INCORPORATED IN THE GAND2 AND GFE2 PORTIONS OF THE GULF GENERAL ATOMIC FAST CROSS SECTION PACKAGE, GAF/GAR/GAND (ACC ABSTRACT 596) AND IN THE FAST SECTION OF THE GGC5 CODE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1969.
UNIVAC1108 VERSION OF GANDY SUBMITTED JUNE 1968, REPLACED BY GANDY3 APRIL 1974.

10. REFERENCES - D. R. MATHEWS AND P. K. KOCH, GANDY3, A COMPUTER PROGRAM FOR THE EVALUATION OF EFFECTIVE CROSS SECTIONS IN THE UNRESOLVED RESONANCE REGION, GA-A12826, JANUARY 1974.

S. C. COHEN AND P. K. KOCH, GANDY, A COMPUTER PROGRAM FOR THE EVALUATION OF EFFECTIVE CROSS SECTIONS IN THE UNRESOLVED RESONANCE REGION, GA-8003, MAY 1967.

F. T. ADLER AND Y. D. NALIBOFF, A DIRECT METHOD FOR THE EVALUATION OF THE RESONANCE LINE SHAPE FUNCTIONS, JOURNAL OF NUCLEAR ENERGY, PARTS A/B, VOL. 14, PP. 209-211, 1961.

J. H. FERZIGER, P. GREEBLER, M. D. KELLEY, AND J. W. WALTON, RESONANCE INTEGRAL CALCULATIONS FOR EVALUATION OF DOPPLER COEFFICIENTS, THE RAPTURE CODE, GEAP-3923, JULY 1962.

R. J. ARCHIBALD AND D. R. MATHEWS, THE GAF/GAR/GAND FAST REACTOR CROSS SECTION PREPARATION SYSTEM, GAND2 AND GFE2 - COMPUTER PROGRAMS FOR PREPARING INPUT DATA FOR THE GAFGAR, GGC, AND MICROX CODES FROM AN ENDF/B FORMAT NUCLEAR DATA FILE, GA-7542, VOL. II, MARCH 1973.

D. R. MATHEWS, ET AL., GGC-5, A COMPUTER PROGRAM FOR CALCULATING NEUTRON SPECTRA AND GROUP CONSTANTS, GA-8871, SEPTEMBER 27, 1971.

11. MACHINE REQUIREMENTS - GANDY3 REQUIRES ABOUT 8300 LOCATIONS FOR INSTRUCTIONS AND 22,700 LOCATIONS FOR DATA. TWO I/O DEVICES ARE REQUIRED FOR READING AND PRINTING AND ONE ADDITIONAL I/O DEVICE IS NECESSARY IF THE PROGRAM IS LOADED FROM TAPE.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - EXEC8.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - ADAPTATION OF THE GANDY3 CODE TO A SMALLER MACHINE WITH A FORTRAN IV COMPILER CAN BE MADE BY CHANGING ARRAY DIMENSIONS WHICH WILL ALLOW FOR CALCULATIONS AT FEWER ENERGY POINTS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE -
SOURCE DECK (1253 CARDS)
SAMPLE PROBLEM (23 CARDS)
REFERENCE REPORT, GA-A12826

17. CATEGORY - A
KEYWORDS - CAPTURE, FISSION, SCATTERING, RESONANCE CROSS SECTIONS, UNRESOLVED REGION, GAFGAR CODES, GAND2 CODES, RAPTURE CODES, GGC5 CODES, GFE2 CODES

1. NAME OR DESIGNATION OF PROGRAM - MO648

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - MO648 SOLVES THE ONE-DIMENSIONAL SLAB TRANSPORT PROBLEM WITH SLOWING DOWN FOR AN ARBITRARY SPATIAL EXTERNAL SOURCE AND ARBITRARY SCATTERING.

4. METHOD OF SOLUTION - THE DOUBLE LEGENDRE POLYNOMIAL EXPANSION OF THE FLUX IS UTILIZED TO OBTAIN A SYSTEM OF LINEAR DIFFERENTIAL EQUATIONS WHICH IS SOLVED WITH A ROUND-OFF FREE ANALYTIC TECHNIQUE (SEE REFERENCE 2). THE ENERGY GROUP CONCEPT IS UTILIZED AND THE SOLUTION IS REPEATED FOR EACH ENERGY GROUP IN CONNECTION WITH THE SLOWING DOWN MATRIX WHICH MUST BE PROVIDED AS INPUT.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   17 ENERGY GROUPS
   12 REGIONS
   8 LEGENDRE POLYNOMIAL EXPANSION COEFFICIENTS
   99 EQUALLY-SPACED MESH POINTS PER REGION
   440 MESH POINTS
   10 MATERIAL COMPOSITIONS
   NO COMPOSITION CAN CONSIST OF A MULTIPLYING MEDIUM OR OF A PURE ABSORBER. THE BOUNDARY CONDITIONS CAN BE ARBITRARY INCIDENT ON EITHER END OR SYMMETRY ON ONE OR BOTH ENDS OF THE SLAB.

6. TYPICAL RUNNING TIME - FOR A TYPICAL PROBLEM OF 7 ENERGY GROUPS, 350 MESH POINTS, AND 5 REGIONS, CENTRAL PROCESSOR TIME IS ABOUT 2 MINUTES.

7. UNUSUAL FEATURES OF THE PROGRAM - MO648 IS PARTICULARLY SUITED FOR DEEP PENETRATION PROBLEMS AND FOR PROBLEMS WHERE THE ANGULAR DISTRIBUTION IS REQUIRED WITH GOOD ACCURACY.

8. RELATED AND AUXILIARY PROGRAMS - MO756 IS SIMILAR TO MO648 BUT FOR GAMMA RAYS ONLY.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1969.
   CDC6600 VERSION SUBMITTED JUNE 1968.

10. REFERENCES - L. LOIS, A SOLUTION OF THE SLAB TRANSPORT PROBLEM, WAPD-TM-661, NOVEMBER 1967.
   L. LOIS, NUMERICAL SOLUTION OF THE ONE VELOCITY BOLTZMANN NEUTRON TRANSPORT EQUATION IN SLAB GEOMETRY, THESIS, COLUMBIA UNIVERSITY, 1966.
   C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1968.

11. MACHINE REQUIREMENTS - 154K OCTAL MEMORY AND 4 TAPE UNITS FOR SCRATCH STORAGE

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (2230 CARDS)
SAMPLE PROBLEM (25 CARDS)
REFERENCE REPORT AND SUPPLEMENT

17. CATEGORY - I
KEYWORDS - STRUCTURAL ANALYSIS, STRESSES, DEFORMATION

ACC ABSTRACT 358 03/75

1. NAME OR DESIGNATION OF PROGRAM - TWOTRAN2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC7600,6600, IBM360/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - TWOTRAN2 SOLVES THE TWO-DIMENSIONAL MULTIGROUP TRANSPORT EQUATION IN (X,Y), (R,THETA), AND (R,Z) GEOMETRIES. BOTH REGULAR AND ADJOINT, INHOMOGENEOUS AND HOMOGENEOUS (KEFF AND EIGENVALUE SEARCHES) PROBLEMS SUBJECT TO VACUUM, REFLECTIVE, PERIODIC, WHITE OR INPUT-SPECIFIED BOUNDARY FLUX CONDITIONS ARE SOLVED. GENERAL ANISOTROPIC SCATTERING IS ALLOWED AND ANISOTROPIC INHOMOGENEOUS SOURCES ARE PERMITTED.

4. METHOD OF SOLUTION - THE DISCRETE ORDINATES APPROXIMATION FOR THE ANGULAR VARIABLE IS USED IN FINITE DIFFERENCE FORM WHICH IS SOLVED WITH THE CENTRAL (DIAMOND) DIFFERENCE APPROXIMATION. NEGATIVE FLUXES ARE ELIMINATED BY A LOCAL SET-TO ZERO AND CORRECT ALGORITHM. STANDARD INNER (WITHIN-GROUP) AND OUTER ITERATIVE CYCLES ARE ACCELERATED BY A COARSE-MESH REBALANCING ON A COARSE MESH WHICH MAY BE INDEPENDENT OF THE MATERIAL MESH.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - VARIABLE DIMENSIONING IS USED SO THAT ANY COMBINATION OF PROBLEM PARAMETERS LEADING TO A CONTAINER ARRAY LESS THAN MAXLEN CAN BE ACCOMMODATED. ON IBM MACHINES, TWOTRAN2 WILL EXECUTE IN THE 4-BYTE MODE SO THAT ANY COMBINATION OF PROBLEM PARAMETERS LEADING TO A CONTAINER ARRAY LESS THAN MAXLEN CAN BE ACCOMMODATED. MAXLEN CAN BE SEVERAL HUNDRED THOUSAND AND MOST PROBLEMS CAN BE CORE-CONTAINED. ON THE CDC MACHINES MAXLEN CAN BE SLIGHTLY GREATER THAN 40,000 WORDS AND PERIPHERAL STORAGE IS USED FOR MOST GROUP-DEPENDENT DATA.

6. TYPICAL RUNNING TIME - A SIX-GROUP, S4, 42 X 42 MESH POINT, KEFF CALCULATION OF AN EBR-II MODEL REQUIRES ABOUT 3.9 MINUTES OF CDC7600 TIME. THE SAMPLE PROBLEMS REQUIRE 6 MINUTES ON THE IBM360.

7. UNUSUAL FEATURES OF THE PROGRAM - PROVISION IS MADE FOR CREATION OF STANDARD INTERFACE OUTPUT FILES FOR SN CONSTANTS, ANGLE-INTEGRATED FLUXES AND ANGULAR FLUXES. STANDARD INTERFACE INPUT FILES FOR SOURCES, FLUXES, CROSS SECTIONS AND SN CONSTANTS MAY BE READ. ALL BINARY OPERATIONS ARE LOCALIZED IN SUBROUTINES CALLED REED AND RITE. DETAILED EDIT OPTIONS, INCLUDING ANGULAR FLUXES, DUMPS AND RESTART CAPABILITY ARE PROVIDED. OPTIONAL USE OF AN ARBITRARY REBALANCE MESH INDEPENDENT OF THE MATERIAL MESH IS ALLOWED.

8. RELATED AND AUXILIARY PROGRAMS - TWOTRAN2 IS AN IMPROVED VERSION OF THE TWOTRAN PROGRAM. MANY COMMENT CARDS WERE ADDED AND MUCH SIMPLIFYING PROGRAMMING WAS PERFORMED TO MAKE TWOTRAN2 AS EASY TO UNDERSTAND AS POSSIBLE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED SEPTEMBER 1969.
UNIVAC1108 X-Y VERSION SUBMITTED DECEMBER 1968, REPLACED BY UPDATED EDITION JUNE 1970, DELETED JUNE 1973.
UNIVAC1108 R-Z VERSION SUBMITTED OCTOBER 1969, DELETED JUNE 1973.
IBM360 X-Y VERSION SUBMITTED APRIL 1969, REPLACED BY TWOTRAN2 JUNE 1973, REVISED VERSION B APRIL 1974, REVISED VERSION C DECEMBER 1974, REVISED VERSION D JANUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC.
CDC6600 GENERAL GEOMETRY VERSION SUBMITTED JULY 1970, REPLACED BY TWOTRAN2 JULY 1973, REVISED VERSION B APRIL 1974, REVISED VERSION C DECEMBER 1974, REVISED VERSION D JANUARY 1975.
CDC7600 VERSION OF TWOTRAN2 SUBMITTED JUNE 1973, REVISED VERSION B APRIL 1974, REVISED VERSION C DECEMBER 1974, REVISED VERSION D JANUARY 1975.

10. REFERENCES - K. D. LATHROP AND F. W. BRINKLEY, TWOTRAN-II, AN INTERFACED, EXPORTABLE VERSION OF THE TWOTRAN CODE FOR TWO-DIMENSIONAL TRANSPORT, LA-4848-MS, JULY 1973.
K. D. LATHROP AND F. W. BRINKLEY, THEORY AND USE OF THE GENERAL-GEOMETRY TWOTRAN PROGRAM, LA-4432, APRIL 1970.
K. D. LATHROP, F. W. BRINKLEY, AND P. ROOD, THEORY AND USE OF THE SPHERICAL HARMONICS, FIRST COLLISION SOURCE, AND VARIABLE WEIGHT VERSIONS OF THE TWOTRAN TRANSPORT PROGRAM, LA-4600, MARCH 1972.

11. MACHINE REQUIREMENTS - FIVE OUTPUT UNITS, FIVE INTERFACE UNITS (USE OF INTERFACE UNITS IS OPTIONAL) AND TWO SYSTEM INPUT/OUTPUT UNITS ARE REQUIRED. A LARGE BULK MEMORY IS DESIRABLE, BUT IT CAN BE REPLACED BY DISK, DRUM OR TAPE STORAGE.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED -

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (7600-7076 CARDS, 6600-7077 CARDS, 360-7495 CARDS)
SAMPLE PROBLEMS (7600-1985 CARDS, 6600-685 CARDS, 360-1986 CARDS)
CONTROL INFORMATION (JCL 360-61 CARDS)
IBM 2314 LOAD MODULE (360-330 BLOCKS)
SAMPLE PROBLEM OUTPUT (360-50 SELECTED PAGES, 6600,7600-51 SELECTED PAGES)
REFERENCE REPORT, LA-4848-MS

17. CATEGORY - C
KEYWORDS - 2-DIMENSIONAL, TRANSPORT THEORY, SN METHOD, X-Y, R-Z, R-THETA, CRITICALITY SEARCHES, FLUX DISTRIBUTION, ANISOTROPIC SCATTERING, 2DF CODES, TWOTRAN CODES

ACC ABSTRACT 359 03/72

1. NAME OR DESIGNATION OF PROGRAM - PUN1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - PUN1 EVALUATES UNRESOLVED RADIATIVE CAPTURE INTEGRALS AND RELATED MULTIGROUP CROSS SECTIONS. THE UNRESOLVED DISTRIBUTIONS MAY HAVE VARIOUS ORBITAL ANGULAR MOMENTUM QUANTUM NUMBERS AND THE EFFECTS OF DOPPLER BROADENING AND SELF-SHIELDING ARE INCLUDED.

4. METHOD OF SOLUTION - THE PSI(THETA,X) FUNCTION IS EVALUATED ON THE INTERVAL (0,20/THETA) BY THE CFB ROUTINE DEVELOPED BY GELBARD (SEE REFERENCE 2). THE J(THETA,BETA) FUNCTION IS OBTAINED FROM THE PSI(THETA,X) FUNCTION BY TWO TRAPEZOIDAL INTEGRATIONS, FOLLOWED BY RICHARDSON EXTRAPOLATION PLUS A WING CORRECTION FOR X GREATER THAN 20/THETA. THE INTEGRAL INVOLVING CHI-SQUARE FLUCTUATION OF THE REDUCED NEUTRON WIDTH, GAMMA(NO), IS EVALUATED BY GAUSSIAN QUADRATURE. THE INTEGRATION OVER THE NEUTRON WEIGHTING SPECTRUM IS APPROXIMATED BY GAUSS QUADRATURE FOR THE 1/E CASE AND TRAPEZOIDAL INTEGRATION FOR OTHER WEIGHTING SPECTRA.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - NO MORE THAN 20 SPIN STATES PER CASE AND 54 ENERGY GROUPS ARE ALLOWED. AN ARBITRARY ENERGY WEIGHTING SPECTRUM OF UP TO 498 POINTS MAY BE USED, BUT ALL POINTS MUST BE POSITIVE (W(E) GREATER THAN 0).

6. TYPICAL RUNNING TIME - LESS THAN 1/4 SECOND PER SPIN STATE PER GROUP IS REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM -
   (A) ANGULAR MOMENTUM QUANTUM NUMBER L = 0, 1, 2, 3, 4 PERMITTED.
   (B) GAMMA(NO) PERMITTED TO FLUCTUATE WITH A CHI-SQUARE DISTRIBUTION OF UP TO 8 DEGREES OF FREEDOM FOR EACH SPIN STATE.
   (C) EVALUATION OF THE INTEGRAL CONTRIBUTION FROM LEVELS WITH GAMMA(NO) LESS THAN SOME FRACTION OF THE AVERAGE PERMITTED.
   (D) AN ARBITRARY GROSS ENERGY WEIGHTING SPECTRUM PERMITTED.
   (E) DANCOFF CORRECTION IS COMPUTED INTERNALLY FOR EITHER HEXAGONAL OR SQUARE LATTICE ARRAYS OF CYLINDRICAL CLAD FUEL RODS.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED SEPTEMBER 1969.
   CDC6600 VERSION SUBMITTED APRIL 1969.

10. REFERENCES - N. M. STEEN, PUN-1 - A FORTRAN-IV PROGRAM FOR THE EVALUATION OF UNRESOLVED RESONANCE INTEGRALS AND RELATED MULTIGROUP CROSS SECTIONS (LWBR DEVELOPMENT PROGRAM), WAPD-TM-768,

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - EXEC II.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - A CALL TO SETEOF IS COMPLETELY UNNECESSARY BUT ELIMINATES AN UNNECESSARY DIAGNOSTIC ON THE 1108.

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECK (1175 CARDS)
    BINARY DECK (505 CARDS)
    SAMPLE PROBLEM (71 CARDS)
    LIBRARY (1512 CARDS)
    REFERENCE REPORT AND NOTE

17. CATEGORY - D
    KEYWORDS - 2-GROUP, ISOTOPES, PRODUCTION, DECAY, FISSION PRODUCTS, REACTION RATES

1. NAME OR DESIGNATION OF PROGRAM - FLANGE2(71-1)

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - FLANGE2 TAKES CROSS SECTIONS, ANGULAR DISTRIBUTION, RESONANCE PARAMETER, AND THERMAL SCATTERING LAW DATA FROM ENDF/B FORMAT II OR III DATA TAPES AND PREPARES THERMAL MULTIGROUP CROSS SECTIONS AND SCATTERING MATRICES.

4. METHOD OF SOLUTION - DIRECT INTEGRATION OF THE SCATTERING LAW IS USED TO OBTAIN LEGENDRE MOMENTS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -
   MAXIMUM ENERGY GROUPS = 200
   MAXIMUM LEGENDRE ORDER = 5

6. TYPICAL RUNNING TIME - A SMOOTH CROSS SECTION CALCULATION REQUIRES APPROXIMATELY 1 MINUTE, WHILE A FULL SCATTERING MATRIX PROBLEM (L=5) FOR 30 ENERGY GROUPS TAKES ABOUT 12 MINUTES ON THE IBM360/65.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - KERINT(71-1) GENERATES SCATTERING MATRICES AT TEMPERATURES INTERMEDIATE BETWEEN MATRICES GENERATED BY FLANGE2.

9. STATUS - ABSTRACT FIRST DISTRIBUTED SEPTEMBER 1969.
   IBM360 VERSION OF FLANGE2 SUBMITTED JANUARY 1969, REPLACED BY FLANGE2(71-1) MARCH 1972, LFIT SUBROUTINE REPLACED NOVEMBER 1974, SAMPLE PROBLEM EXECUTED BY ACC.
   UNIVAC1108 VERSION OF FLANGE2 SUBMITTED MAY 1970, DELETED MARCH 1972.
   UNIVAC1108 VERSION OF FLANG2/SC SUBMITTED DECEMBER 1970, DELETED MARCH 1972.

10. REFERENCES - H. C. HONECK AND D. R. FINCH, FLANGE-II (VERSION 71-1), A CODE TO PROCESS THERMAL NEUTRON DATA FROM AN ENDF/B TAPE, DP-1278 (ENDF-152), OCTOBER 1971, AND CORRECTION NOTICE.

11. MACHINE REQUIREMENTS - 40K SINGLE-PRECISION WORDS OF HIGH-SPEED CORE PLUS 3 TAPE (OR DISK) UNITS

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - FLANGE2 REQUIRES FOR INPUT THE ENDF/B LIBRARY WHICH IS AVAILABLE

ANY OTHER INFORMATION OR RESTRICTIONS (CONTINUED)
FROM THE NATIONAL NEUTRON CROSS SECTION CENTER AT BROOKHAVEN
NATIONAL LABORATORY.

NAME AND ESTABLISHMENT OF AUTHORS -
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MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (FLANGE2 3251 CARDS, KERINT 351 CARDS)
SAMPLE PROBLEMS (FLANGE2 23 CARDS, KERINT 75 CARDS)
CONTROL INFORMATION (JCL FLANGE2 78 CARDS, KERINT 21 CARDS)
REFERENCE REPORT AND CORRECTION NOTICE

CATEGORY - B
KEYWORDS - THERMAL MULTIGROUP CROSS SECTIONS, SCATTERING LAW,
ANGULAR DISTRIBUTION, RESONANCE PARAMETERS, KERINT
CODES

1. NAME OR DESIGNATION OF PROGRAM - RELAP4/MOD003

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - RELAP4 HAS BEEN DEVELOPED TO DESCRIBE THE BEHAVIOR OF WATER-COOLED NUCLEAR REACTORS SUBJECTED TO POSTULATED TRANSIENTS SUCH AS THOSE RESULTING FROM LOSS OF COOLANT, PUMP FAILURE, OR POWER EXCURSIONS. THE PROGRAM CALCULATES FLUID CONDITIONS SUCH AS FLOW, PRESSURE, MASS INVENTORY, AND QUALITY; THERMAL CONDITIONS SUCH AS SURFACE TEMPERATURES, TEMPERATURE PROFILES, AND ENERGY DISTRIBUTIONS; AND HEAT FLUXES IN POWER GENERATING AND DISSIPATING ELEMENTS. THE PROGRAM ALSO CALCULATES REACTOR POWER, DECAY HEAT, AND REACTIVITY. IN ADDITION TO DESCRIBING TRANSIENTS IN BOILING-WATER AND PRESSURIZED-WATER REACTORS, THE PROGRAM IS SUFFICIENTLY VERSATILE TO DESCRIBE TRANSIENTS IN EXPERIMENTAL THERMAL-HYDRAULIC SYSTEMS. THIS VERSION OF RELAP4 DOES NOT PROVIDE ALL OF THE SUBROUTINES REQUIRED FOR COMPLIANCE WITH THE AEC'S FINAL RULING ON THE ACCEPTANCE CRITERIA FOR ECC SYSTEMS.

4. METHOD OF SOLUTION - THE RELAP4 USER MUST DEFINE THE GEOMETRIC FEATURES OF THE SYSTEM TO BE ANALYZED AS WELL AS AN APPROPRIATE SET OF INITIAL CONDITIONS. RELAP4 THEN SOLVES AN INTEGRAL FORM OF THE FLUID CONSERVATION AND STATE EQUATIONS APPLIED TO EACH USER-DEFINED CONTROL VOLUME.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -
   - 9 MINOR EDIT VARIABLES
   - 20 TIME-STEP CARDS
   - 20 TRIP CONTROL CARDS
   - 100 JUNCTIONS (FLOW PATHS) BETWEEN VOLUMES
   - 5 BUBBLE-PARAMETER SETS
   - 10 TIME-DEPENDENT VOLUME DESCRIPTIONS ON CARDS
   - 12 PUMPS
   - 75 CONTROL VOLUMES
   - 10 CHECK VALVE TYPES
   - 5 NORMALIZED-LEAK-AREA-VERSUS-TIME CURVES
   - 5 FILL SYSTEM CURVES
   - 50 HEAT SLABS
   - 20 HEAT SLAB GEOMETRIES
   - 7 HEAT SLAB MATERIALS
   - 25 CORE SECTIONS
   - 20 DATA SETS FOR HEAT EXCHANGERS WITHOUT CONDUCTION

6. TYPICAL RUNNING TIME - FOR A TYPICAL REACTOR SYSTEM MODELED WITH 40 VOLUMES, 50 JUNCTIONS, AND 45 HEAT SLABS 20 HOURS OF IBM360/75 TIME ARE REQUIRED FOR BLOWDOWN. ABOUT 2 MINUTES ARE REQUIRED TO EXECUTE THE SAMPLE PROBLEM ON AN IBM370/195.

7. UNUSUAL FEATURES OF THE PROGRAM - RELAP4 HAS THE FOLLOWING FEATURES: FULLY IMPLICIT INTEGRATION TECHNIQUE, STEAM TABLES THAT

7. UNUSUAL FEATURES OF THE PROGRAM (CONTINUED)
CONTAIN DERIVATIVES, HEAT CONDUCTION BETWEEN FLUID VOLUMES, MOMENTUM FLUX TERMS IN HYDRAULIC EQUATIONS, PUMP MODEL WITH INERTIA AND FRICTION, NO AIR FLOW ALLOWED, SEPARATE HOT CHANNEL CALCULATION AVAILABLE, CORE CROSS FLOW ALLOWED.

8. RELATED AND AUXILIARY PROGRAMS - RELAP4 SUPERSEDES RELAP3 AND USES PLOTR4 TO PLOT OUTPUT.

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1974.
IBM360 VERSION SUBMITTED MARCH 1974, 1ST REVISION EDITION B MAY 1974, 2ND REVISION SEPTEMBER 1974, 3RD REVISION EDITION C NOVEMBER 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - K. V. MOORE AND W. H. RETTIG, RELAP4 - A COMPUTER PROGRAM FOR TRANSIENT THERMAL-HYDRAULIC ANALYSIS, ANCR-1127, DECEMBER 1973, REVISED AUGUST 16, 1974.
NRTS ENVIRONMENTAL SUBROUTINE MANUAL, ANC DOCUMENT, DECEMBER 1972.
RELAP4, ACC NO. 369, TAPE CONTENTS DESCRIPTION, ACC PROGRAMMING NOTE 74-33, APRIL 22, 1974, REVISED APRIL 29, 1974, REVISED DECEMBER 1974.
RELAP4, ACC NO. 369, TAPE CONTENTS DESCRIPTION, 360 VERSION FOR NON-360 REQUESTS, ACC PROGRAMMING NOTE 74-37, JUNE 11, 1974, REVISED DECEMBER 1974.
W. H. RETTIG, UPD - A PROGRAM OF UPDATE SOURCE DECKS, P01751, AND ADDENDUM TO UPD BY R. C. YOUNG AND N. F. MARSHALL.
G. D. BROWN, C. H. BUSH, AND R. A. BERMAN, THE INTEGRATED GRAPHICS SYSTEM FOR THE SC4060: I. USER'S MANUAL, RM-5660-PR, DECEMBER 1968.

11. MACHINE REQUIREMENTS - 670K BYTES, 3 TAPE DRIVES, AND A CALCOMP PLOTTER

12. PROGRAMMING LANGUAGES USED - FORTRAN IV (95%)
BAL(5%)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360, OS/370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - PLOTR4 AS EXECUTED AT NRTS MAKES USE OF THE SC-4060 INTEGRATED GRAPHICS SYSTEM FOR MICROFILM OUTPUT IN ADDITION TO THE CALCOMP GRAPHICAL OUTPUT. THE IGS SUBROUTINES SUBJEG, TITLEG, MODESG, SETUPG, GRIDG, LABELG, LINESG, POINTG, ERRZZ, SETSMG, PAGEG, AND EXITG HAVE BEEN DUMMIED IN THE PLOTR4 SOURCE FILE. HOWEVER, THE NON-DUMMIED ROUTINES ARE INCLUDED IN THE ENVIRONMENTAL SUBROUTINES FILE.
COMPILATION OF SUBROUTINE PREW WAS SUCCESSFUL WHEN COMPILER SIZE=450K WAS SPECIFIED AT SYSGEN. PREW OVERFLOWED A TABLE WHEN THE COMPILER WAS GENERATED WITH SIZE=240K.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
(360 1 TAPE, NON-360** 2 TAPES)
SOURCE DECKS (RELAP4 360 & NON-360 26,578 CARDS)
AUXILIARY PROGRAM SOURCE DECKS (PLOTR4 360 & NON-360 1364 CARDS)
2314 AND 3330 LOAD MODULES (RLP4 360 612 BLOCKS, ENVIRO 360 549 BLOCKS)
OBJECT DECKS (PLOTR4 360 52 CARDS)
SAMPLE PROBLEMS (RELAP4 360 & NON-360 170 CARDS, PLOTR4 360 & NON-360 67 CARDS)
STEAM TABLES DATA (360 79 BLOCKS, NON-360 2544 CARDS)
ENVIRONMENTAL SUBROUTINES (360 & NON-360 21,692 CARDS)
CONTROL INFORMATION (JCL RELAP4 360 & NON-360 86 CARDS)
SAMPLE PROBLEM OUTPUT (RELAP4 62 PAGES, PLOTR4 2 PAGES AND 12 PLOTS)
REFERENCE REPORTS, ANCR-1127 AND ANC DOCUMENT, ACC NOTES, AND P01751 AND ADDENDUM
** 360 VERSION FOR NON-360 USERS

17. CATEGORY - G
KEYWORDS - ACCIDENTS, BLOWDOWN, EXCURSIONS, HEAT TRANSFER, HYDRODYNAMICS, POWER PLANTS, REACTOR SAFETY, TRANSIENTS

ACC ABSTRACT 387 03/75

1. NAME OR DESIGNATION OF PROGRAM - CITATION

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - CITATION IS DESIGNED TO SOLVE PROBLEMS INVOLVING THE FINITE-DIFFERENCE REPRESENTATION OF DIFFUSION THEORY TREATING UP TO THREE SPACE DIMENSIONS WITH ARBITRARY GROUP-TO-GROUP SCATTERING. X-Y-Z, THETA-R-Z, HEXAGONAL-Z, AND TRIAGONAL-Z GEOMETRIES MAY BE TREATED. DEPLETION PROBLEMS MAY BE SOLVED AND FUEL MANAGED FOR MULTI-CYCLE ANALYSIS. EXTENSIVE FIRST-ORDER PERTURBATION RESULTS MAY BE OBTAINED, GIVEN MICROSCOPIC DATA AND NUCLIDE CONCENTRATIONS. STATICS PROBLEMS MAY BE SOLVED AND PERTURBATION RESULTS OBTAINED WITH MICROSCOPIC DATA.

4. METHOD OF SOLUTION - EXPLICIT, FINITE-DIFFERENCE APPROXIMATIONS IN SPACE AND TIME HAVE BEEN IMPLEMENTED. THE NEUTRON-FLUX-EIGENVALUE PROBLEMS ARE SOLVED BY DIRECT ITERATION TO DETERMINE THE MULTIPLICATION FACTOR OR THE NUCLIDE DENSITIES REQUIRED FOR A CRITICAL SYSTEM.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - CITATION HAS BEEN DESIGNED TO ATTACK PROBLEMS WHICH CAN BE RUN IN A REASONABLE AMOUNT OF TIME. STORAGE OF DATA IS ALLOCATED DYNAMICALLY TO GIVE THE USER FLEXIBILITY IN DIMENSIONING. TYPICALLY, A FINITE-DIFFERENCE DIFFUSION PROBLEM COULD HAVE 200 DEPLETING ZONES, 10,000 NUCLIDE DENSITIES AND 30,000 SPACE-ENERGY POINT FLUX VALUES.

6. TYPICAL RUNNING TIME - THE TWO-DIMENSIONAL FINITE-DIFFERENCE DIFFUSION THEORY EIGENVALUE PROBLEMS ITERATE AT A RATE OF ABOUT 0.1 MILLISECOND PER POINT PER ITERATION WITH ALTERNATING-DIRECTION LINE RELAXATION (TWO SWEEPS PER ITERATION) WITH 8-BYTE WORDS ON THE IBM360/91 (0.5 ON THE 360/75). SINCE ABOUT 30 ITERATIONS ARE REQUIRED FOR EACH SUCCEEDING EIGENVALUE PROBLEM, MACHINE TIME FOR A DEPLETION PROBLEM IS ABOUT .003 SECOND PER POINT PER TIME-STEP. MACHINE TIME FOR MOST AUXILIARY CALCULATIONS IS USUALLY INSIGNIFICANT. FOR A REPRESENTATIVE FAST BREEDER DEPLETION PROBLEM, 68 PERCENT OF THE MACHINE CPU TIME IS SPENT IN SOLVING EIGENVALUE PROBLEMS.

7. UNUSUAL FEATURES OF THE PROGRAM - CITATION IS CONSIDERED UNUSUAL IN THAT IT SHOULD BE RELATIVELY EASY TO MODIFY THE CONTENTS OR TO ADD ROUTINES. EFFECTIVE TECHNIQUES ARE INCORPORATED TO DETERMINE A CRITICAL SYSTEM. MORE THAN ONE SET OF MICROSCOPIC CROSS SECTIONS MAY BE USED IN A SYSTEM AND NUCLIDE BEHAVIOR CAN BE FOLLOWED ON A SUB-ZONE SCALE WITHIN DEPLETION REGIONS. THE USER HAS FLEXIBLE CONTROL OVER THE ROUTE OF A CALCULATION AS WELL AS OF THE EDIT OF RESULTS.

8. RELATED AND AUXILIARY PROGRAMS - THE MICROSCOPIC CROSS SECTION TAPE FOR THIS PROGRAM MAY BE GENERATED BY VARIOUS CODES, BUT XSDRN

8. RELATED AND AUXILIARY PROGRAMS (CONTINUED)
(ACC ABSTRACT 393) IS DESIGNED SPECIFICALLY FOR THIS PURPOSE. THE MICROSCOPIC CROSS SECTION ROUTINES, FORMERLY AN AUXILIARY PROGRAM, WERE INTEGRATED INTO THE CODE TO PERMIT SUCH DATA TO BE SUPPLIED FROM CARDS OR MODIFIED IN THE SAME RUN AS A PROBLEM IS SOLVED.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1970.
IBM360 VERSION SUBMITTED JULY 1969, REVISED JANUARY 1970, 2ND REVISION APRIL 1970, 3RD REVISION NOVEMBER 1971, 4TH REVISION APRIL 1972, 5TH REVISION JUNE 1972, 6TH REVISION AUGUST 1972, 7TH REVISION NOVEMBER 1972, 8TH REVISION AUGUST 1974.

10. REFERENCES - T. B. FOWLER, D. R. VONDY, AND G. W. CUNNINGHAM, NUCLEAR REACTOR CORE ANALYSIS CODE CITATION, ORNL-TM-2496, REVISION 2, JULY 1971, SUPPLEMENT 1, OCTOBER 1971, SUPPLEMENT 2, MARCH 1972, SUPPLEMENT 3, JULY 1972.
N. M. GREENE AND C. W. CRAVEN, JR., XSDRN, A DISCRETE ORDINATES SPECTRAL AVERAGING CODE, ORNL-TM-2500, JULY 1969.
D. R. VONDY AND T. B. FOWLER, JOB STREAM OF CASES FOR THE COMPUTER CODE CITATION, ORNL-TM-3793, JULY 1972.

11. MACHINE REQUIREMENTS - IBM360/91 OR EQUIVALENT WITH AT LEAST 128,000 4-BYTE WORDS OF DIRECTLY-ADDRESSABLE CORE STORAGE, 7 TO 32 I/O DEVICES DEPENDING UPON THE CALCULATION, EXCLUDING INPUT AND OUTPUT DEVICES AND SYSTEM REQUIREMENTS.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - NOW CITATION CONTAINS ABOUT 25,000 SOURCE STATEMENTS. WITHOUT OVERLAY, STORAGE FOR THE CODE INSTRUCTIONS WOULD APPROACH 150,000 4-BYTE WORDS, BUT WITH OVERLAY THE STORAGE REQUIREMENT IS ABOUT 43,000 FOR THE PROGRAM AND FIXED STORAGE, INCLUDING 10,000 FOR SYSTEM LIBRARY ROUTINES.

15. NAME AND ESTABLISHMENT OF AUTHORS -
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (28,478 CARDS)
SAMPLE PROBLEM (850 CARDS)
REFERENCE REPORT, ORNL-TM-2496, REV.2, SUPPLEMENTS 1, 2, AND 3
REFERENCE REPORT, ORNL-TM-3793, AVAILABLE UPON REQUEST

CATEGORY - K
KEYWORDS - 1-DIMENSIONAL, 2-DIMENSIONAL, 3-DIMENSIONAL, MULTI-GROUP, DIFFUSION, CRITICALITY SEARCHES, BUCKLING, X-Y-Z, R-THETA, HEXAGONAL, DEPLETION, FUEL MANAGEMENT

640.2

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)
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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
SOURCE DECK (609 CARDS)
REFERENCE REPORT, KAPL-M-6729

17. CATEGORY - I
KEYWORDS - STRESSES, SHELLS, STRUCTURAL ANALYSIS, SOR CODES, FATIGUE ANALYSIS

1. NAME OR DESIGNATION OF PROGRAM - RAFFLE

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - RAFFLE CALCULATES NEUTRON FIRST FLIGHT COLLISION PROBABILITIES FOR A WIDE VARIETY OF THREE-DIMENSIONAL CELL GEOMETRY CONFIGURATIONS. THE OUTER BOUNDARIES OF THE CELL CROSS SECTION MAY BE CIRCULAR, SQUARE, OR HEXAGONAL. THE CELL MAY CONTAIN ANNULAR REGIONS AND/OR CLUSTERS OF RODS.

4. METHOD OF SOLUTION - EACH AXIAL SUBDIVISION OF EACH REGION AND ROD IS CHARACTERIZED BY A NUMBER WHICH DESIGNATES ITS MATERIAL, AND THEREBY THE NUCLEAR TOTAL CROSS SECTION. THE MONTE CARLO METHOD IS USED, IN WHICH NEUTRON HISTORIES ARE STARTED AT RANDOM WITHIN MATERIAL NUMBER 1 AND CONTINUED UNTIL A COLLISION OR ESCAPE OCCURS. IF DESIRED, SUCCESSIVE CASES MAY BE RUN IN WHICH THE HISTORIES ARE STARTED IN ANY MATERIAL OF THE CELL MERELY BY RENUMBERING THE MATERIALS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   20 REGIONS
   10 DIFFERENT TYPES OF RODS (DIFFERING IN EITHER GEOMETRY OR MATERIALS)
   50 RODS PER REGION
   20 SUBREGIONS PER ROD
   12 REGIONS WITH RODS (ONLY THE FIRST 12 REGIONS COUNTING FROM THE CELL CENTER)
   8 MATERIALS

6. TYPICAL RUNNING TIME - SIMPLE GEOMETRIES MAY REQUIRE 2 MINUTES FOR A CASE CONSISTING OF 25,000 HISTORIES ON THE IBM360. PROBLEMS IN WHICH THE SOURCE REGION IS A SMALL FRACTION OF THE TOTAL OR THE MEAN FREE PATHS ARE LONG COMPARED TO THE DIMENSIONS OF THE REGIONS MAY TAKE SEVERAL TIMES AS LONG.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - MUCH OF THE BASIC INFORMATION AND SOME PARTS OF THE CODE ITSELF ARE TAKEN FROM THE MORE GENERAL MONTE CARLO CODE, O5R.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1970.
   IBM7090 VERSION SUBMITTED OCTOBER 1969, DELETED FEBRUARY 1975.
   IBM360 VERSION SUBMITTED OCTOBER 1969, REPLACED BY REVISION B FEBRUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - D. W. HERMANN AND R. S. CARLSMITH, RAFFLE, A MONTE CARLO CODE FOR CALCULATION OF FIRST FLIGHT COLLISION PROBABILITIES, ORNL-TM-1699, DECEMBER 1966.
   D. C. IRVING, R. M. FREESTONE, JR., AND F. B. K. KAM,

10. REFERENCES (CONTINUED)
O5R, A GENERAL-PURPOSE MONTE CARLO NEUTRON TRANSPORT CODE, ORNL-3622, FEBRUARY 1965.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND BAL

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - ASSEMBLY LANGUAGE IS USED FOR THE RANDOM NUMBER GENERATION ROUTINES.

15. NAME AND ESTABLISHMENT OF AUTHORS -
O. W. HERMANN AND R. S. CARLSMITH
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OAK RIDGE, TENNESSEE 37830

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (3442 CARDS)
SAMPLE PROBLEM (26 CARDS)
REFERENCE REPORT, ORNL-TM-1699

17. CATEGORY - R
KEYWORDS - CELL CALCULATION, LEAKAGE, MONTE CARLO METHOD, LATTICES, O5R CODES

1. NAME OR DESIGNATION OF PROGRAM - XSDRN

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/65 OR HIGHER

3. DESCRIPTION OF PROBLEM OR FUNCTION - XSDRN USES THE NORDHEIM INTEGRAL TREATMENT, NARROW RESONANCE, OR INFINITE MASS APPROXIMATION TO PROCESS RESONANCE DATA ON A MASTER CROSS SECTION LIBRARY AND THUS OBTAIN MICROSCOPIC FINE-GROUP CROSS SECTIONS FOR A LARGE NUMBER OF NUCLIDES. THE CODE WILL THEN USE THESE CROSS SECTIONS IN AN INDEPENDENT CALCULATION TO SOLVE FOR FLUXES, EIGENVALUES, CRITICAL DIMENSIONS, ETC., USING DISCRETE ORDINATES, DIFFUSION, OR AN INFINITE MEDIUM THEORY CALCULATION. THE FINE-GROUP FLUXES THUS OBTAINED CAN THEN BE USED TO COLLAPSE THE FINE-GROUP CROSS SECTION DATA TO A MORE TENABLE BROAD-GROUP STRUCTURE FOR USE IN SEVERAL INDEPENDENT COMPUTER CODES.

4. METHOD OF SOLUTION - THE PRINCIPAL CALCULATIONS PERFORMED BY XSDRN (RESONANCE CALCULATION AND FLUX CALCULATION) BOTH EMPLOY NUMERICAL FINITE-DIFFERENCE TECHNIQUES. FOR THE RESONANCE CALCULATION, THIS INVOLVES A SIMPSONS INTEGRATION TO SOLVE FOR THE COLLISION DENSITY IN THE RESONANCE RANGE. THE FLUX CALCULATIONS EMPLOY A MULTIGROUP ENERGY STRUCTURE, AN ARBITRARY SPATIAL STRUCTURE AND A MECHANICAL ANGULAR QUADRATURE, ALL OF WHICH MUST BE USED IN THE VARIOUS INTEGRATION AND DIFFERENCING SCHEMES IN THE CODE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE PRINCIPAL RESTRICTION IS THE AVAILABILITY OF ADEQUATE CORE STORAGE TO BUILD REQUIRED ARRAYS. THE CODE IS FLEXIBLY DIMENSIONED WHICH MEANS THAT ARRAY SIZES ARE SET FOR THE PARTICULAR PROBLEM AT EXECUTION TIME. (PROVISIONS ARE ALSO AVAILABLE FOR STORING CERTAIN LARGE DATA ARRAYS OUT OF CORE, IF NEED BE.)

6. TYPICAL RUNNING TIME - TYPICAL RESONANCE CALCULATIONS HAVE BEEN RUN ON THE IBM360/75 IN FROM ONE-HALF TO ONE MINUTE PER NUCLIDE. A TYPICAL FLUX CALCULATION (S4 P3, 25 SPACE POINTS, 123 ENERGY GROUPS, CYLINDER, K-CALCULATION, REDUCE CROSS SECTIONS, 4 RESONANCE NUCLIDES) GENERALLY RUNS IN 10 TO 12 MINUTES. A FIXED SOURCE CALCULATION FOR THE SAME SYSTEM WOULD TAKE APPROXIMATELY THE SAME TIME.

7. UNUSUAL FEATURES OF THE PROGRAM - THE FLEXIBLE DIMENSIONING SCHEME EMPLOYED BY XSDRN ALLOWS ONE TO MAKE OPTIMAL USE OF CORE STORAGE. A UNIQUE METHOD OF STORING CROSS SECTIONS IS EMPLOYED TO ELIMINATE INPUT OF UNNECESSARY TRANSFER CROSS SECTIONS.

8. RELATED AND AUXILIARY PROGRAMS - THE MASTER LIBRARY TAPE FOR XSDRN IS PRODUCED BY XLACS. CROSS SECTION TAPES CAN BE GENERATED FOR ANISN (ACC ABSTRACT 151), DOT, CITATION (ACC ABSTRACT 387), ROD, OR THE EXTERMINATOR2 (ACC ABSTRACT 156) CODES.

ACC ABSTRACT 403 03/75

1. NAME OR DESIGNATION OF PROGRAM - TIGIR2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC66CO

3. DESCRIPTION OF PROBLEM OR FUNCTION - TIGIR IS A MODULAR PROGRAM DESIGNED TO GENERATE AND MAINTAIN LIBRARIES OF DOCUMENT INFORMATION (ABSTRACTS, BIBLIOGRAPHIC INFORMATION, INDEX TERMS, AND OTHER SIGNIFICANT INFORMATION), TO RETRIEVE THE INFORMATION SELECTIVELY, TO PRINT THE RETRIEVED INFORMATION IN VARIOUS OUTPUT FORMATS, AND TO GENERATE STATISTICS OF THE INFORMATION FILES.

4. METHOD OF SOLUTION - INFORMATION IS RETRIEVED ON A SELECTIVE BASIS. THE SELECTION PROCESS EMPLOYED IS ONE WHICH DETERMINES THE TRUTH VALUE OF A REQUEST FOR ANY GIVEN UNIT RECORD, WHERE A UNIT RECORD IS THE INFORMATION FILED FOR A DOCUMENT, AND THE REQUEST IS A BOOLEAN-LIKE EXPRESSION WRITTEN IN THE LANGUAGE USED TO DESCRIBE THE DOCUMENT.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - ONE MINUTE OF CENTRAL PROCESSOR TIME IS REQUIRED TO SEARCH ABOUT 6000 DOCUMENT RECORDS ON TAPE.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1970.
CDC6600 VERSION SUBMITTED SEPTEMBER 1969, REPLACED BY A NEW EDITION OCTOBER 1974.

10. REFERENCES - J. L. COPELAND, R. J. CULLEN, C. H. HUNTER, AND A. E. ZACKRISON, TIGIR, A DOCUMENT RETRIEVAL PROGRAM FOR THE CDC 6600 - USERS REFERENCE MANUAL, KAPL-M-6749(L), JULY 28, 1969.
B. A. BROWN, TIGIR, A DOCUMENT RETRIEVAL PROGRAM FOR THE CDC 6600 AND TIGSORT/EDITMRG, TWO TIGIR MODULES TO PROVIDE SORT CAPABILITY FOR TIGIR FILES, KAPL-M-6749(L) ADDENDUM NO. 1 (REV.), AUGUST 1970.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN AND ASCENT

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - SOME NON-STANDARD OPERATIONS SUCH AS BUFFER ASSIGNMENT AT EXECUTE TIME, RANDOM FILE GENERATION AND USE, AND SHIFTING, HAVE MADE MACHINE LANGUAGE SUBPROGRAMS NECESSARY.

15. NAME AND ESTABLISHMENT OF AUTHORS -

AUTHORS J. L. COPELAND, R. J. CULLEN, C. F. HUNTER, AND A. E. ZACKRISON

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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL
FILE 1 - SOURCE DECK (14,854 CARDS)
FILE 2 - TIGIR2 SYSTEM ROUTINES (180 CARDS)
REFERENCE REPORT AND ADDENDUM

17. CATEGORY - M
KEYWORDS - LIBRARIES, MAINTENANCE, RETRIEVAL, DATA PROCESSING

1. NAME OR DESIGNATION OF PROGRAM - CONTEMPT-LT/022

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE CONTEMPT-LT PROGRAM PREDICTS THE PRESSURE-TEMPERATURE RESPONSE OF A DRY WELL OR A DRY WELL WITH VENTS AND PRESSURE SUPPRESSION SYSTEM TO A LOSS-OF-COOLANT ACCIDENT. AN ADDITIONAL DUAL CONTAINMENT COMPARTMENT MAY ALSO BE MODELED IF DESIRED. THE DRY WELL IS SEPARATED INTO A LIQUID REGION AND A VAPOR REGION. EACH REGION IS ASSUMED TO HAVE A UNIFORM TEMPERATURE BUT THE TEMPERATURES OF THE TWO REGIONS MAY BE DIFFERENT. THE CONTAINMENT BUILDING IS REPRESENTED AS CONSISTING OF SEVERAL HEAT CONDUCTING STRUCTURES WHOSE THERMAL BEHAVIOR CAN BE DESCRIBED BY THE ONE-DIMENSIONAL MULTI-REGION HEAT CONDUCTION EQUATIONS. WATER AND ENERGY RATES FROM DISCHARGE OF COOLANT, BOILING OF RESIDUAL WATER BY REACTOR DECAY HEAT, SUPERHEATING OF STEAM PASSING THROUGH THE CORE, AND METAL-WATER REACTIONS ARE ASSUMED AVAILABLE FROM PREVIOUS CALCULATIONS AND ARE INPUT DATA TO THE PROGRAM. PROGRAM OUTPUT INCLUDES CONTAINMENT VOLUME PRESSURE AND TEMPERATURE, TEMPERATURES THROUGH THE BUILDING STRUCTURES, AND THE AMOUNT OF WATER, VAPOR, AND ENERGY IN THE CONTAINMENT VOLUMES. THE PRESSURE SUPPRESSION CALCULATIONS INCLUDE VENT CLEARING AND FLOW OF A TWO-COMPONENT TWO-PHASE WATER-AIR MIXTURE THROUGH THE VENTS, AND A MASS-ENERGY BALANCE IN THE WET WELL. THERE ARE PROVISIONS FOR NORMAL BUILDING LEAKAGE, LEAKAGE FROM PENETRATIONS, A FAN COOLER SYSTEM, AND DRY AND WET WELL SPRAY SYSTEMS.

4. METHOD OF SOLUTION - THE INITIAL CONDITIONS OF THE CONTAINMENT ATMOSPHERE ARE CALCULATED FROM INPUT VALUES, AND THE INITIAL TEMPERATURE DISTRIBUTIONS THROUGH THE CONTAINMENT STRUCTURES ARE DETERMINED FROM THE STEADY-STATE SOLUTION OF THE HEAT CONDUCTION EQUATIONS. A TIME ADVANCEMENT PROCEEDS AS FOLLOWS. THE INPUT WATER AND ENERGY RATES ARE EVALUATED AT THE MIDPOINT OF A TIME INTERVAL AND ADDED TO THE CONTAINMENT SYSTEM. PRESSURE SUPPRESSION, SPRAY SYSTEM EFFECTS, AND FAN COOLER EFFECTS ARE CALCULATED USING CONDITIONS AT THE BEGINNING OF A TIME-STEP. LEAKAGE AND HEAT LOSSES OR GAINS, EXTRAPOLATED FROM THE LAST TIME-STEP, ARE ADDED TO THE CONTAINMENT SYSTEM. CONTAINMENT VOLUME PRESSURE AND TEMPERATURES ARE ESTIMATED BY SOLVING THE MASS, VOLUME, AND ENERGY BALANCE EQUATIONS. USING THESE RESULTS AS BOUNDARY CONDITIONS, THE HEAT CONDUCTION EQUATIONS DESCRIBING STRUCTURE BEHAVIOR ARE ADVANCED USING AN IMPLICIT TECHNIQUE. THE RESULTING HEAT TRANSFER RATES ARE USED TO CORRECT THE PREVIOUS ESTIMATES OF THE WATER AND ENERGY STORAGE IN THE CONTAINMENT VOLUME, AND THE CONTAINMENT CONDITIONS ARE OBTAINED BY SOLVING FOR THE SECOND TIME THE CONTAINMENT BALANCE EQUATIONS. THE PRESSURE SUPPRESSION ROUTINES USE THE CONDITIONS AT THE BEGINNING OF A TIME-STEP TO CALCULATE BOTH THE INITIAL EXPULSION OF WATER FROM THE VENTS AND THE FLOW THROUGH THE VENTS. FROM THE CALCULATED FLOW RATES, MASS AND ENERGY ARE REMOVED FROM THE DRY WELL AND ADDED TO THE WET WELL.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   20 HEAT STRUCTURES
   101 MESH POINTS PER STRUCTURE
SEVERAL METHODS FOR DESCRIBING NON-CONSTANT HEAT TRANSFER COEFFICIENTS ARE PROVIDED, BUT THE THERMAL CONDUCTIVITY AND HEAT CAPACITY ARE CONSTANT. WATER THERMODYNAMIC PROPERTIES ARE DETERMINED FROM TABLE LOOKUP AND INTERPOLATION PROCEDURES.

6. TYPICAL RUNNING TIME - ON THE IBM360/75, APPROXIMATELY .021 SECOND PER TIME ADVANCEMENT WITH 90 MESH POINTS FOR HEAT STRUCTURES WITHOUT PRESSURE SUPPRESSION IS REQUIRED. THE PRESSURE SUPPRESSION TIMING IS NOT EASILY PREDICTED BUT TWO SAMPLE PROBLEMS RANGED FROM .3 TO 2 SECONDS PER TIME ADVANCEMENT.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - CONTEMPT-LT REPLACES CONTEMPT (ACC ABSTRACT 297), CONTEMPT-CONPS, AND CONTEMPT-PS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
   IBM360 VERSION OF CONTEMPT-CONPS SUBMITTED FEBRUARY 1970, REPLACED BY CONTEMPT-PS APRIL 1971, REPLACED BY CONTEMPT-LT/020 AUGUST 1973, REPLACED BY CONTEMPT-LT/022 DECEMBER 1973, REPLACED BY EDITION B JULY 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - L. C. RICHARDSON, L. J. FINNEGAN, R. J. WAGNER, AND J. M. WAAGE, CONTEMPT, A COMPUTER PROGRAM FOR PREDICTING THE CONTAINMENT PRESSURE-TEMPERATURE RESPONSE TO A LOSS-OF-COOLANT ACCIDENT, IDO-17220, JUNE 1967.

C. F. CARMICHAEL AND S. A. MARKO, CONTEMPT-PS - A DIGITAL COMPUTER CODE FOR PREDICTING THE PRESSURE-TEMPERATURE HISTORY WITHIN A PRESSURE-SUPPRESSION CONTAINMENT VESSEL IN RESPONSE TO A LOSS-OF-COOLANT ACCIDENT, IDO-17252, APRIL 1969.

R. J. WAGNER, CONTEMPT MODIFICATIONS, PHILLIPS PETROLEUM MEMO WAG-24-68 AM, SEPTEMBER 23, 1968.

R. J. WAGNER, CONTEMPT-CONPS MODIFICATIONS, WAG-19-69A-M, MAY 14, 1969.

C. F. CARMICHAEL, MODIFICATIONS TO CONTEMPT/CONPS CODE, IDAHO NUCLEAR MEMO CARM-16-69, SEPTEMBER 17, 1969.

L. C. RICHARDSON, DATE SUBROUTINE S0000C10, PHILLIPS PETROLEUM NOTE, NOVEMBER 1968.

R. J. WAGNER, CVI INPUT SUBROUTINE, IDAHO NUCLEAR NOTE, MAY 1969.

R. L. MUELLER, 360/75 INTERVAL TIMER ROUTINE S00030, PHILLIPS PETROLEUM NOTE, OCTOBER 10, 1968.

K. D. RICHERT, BUFIO, A SUBROUTINE TO PERMIT FORTRAN ACCESS TO IOOP, PHILLIPS PETROLEUM NOTE, FEBRUARY 1966.

A. J. SMITH, CALCOMP PLOTTER SUBROUTINES, PHILLIPS PETROLEUM DESCRIPTION, FEBRUARY 1969.

NRTS ENVIRONMENTAL SUBROUTINE MANUAL, ANC DOCUMENT, DECEMBER 1972.

R. J. WAGNER AND L. L. WHEAT, CONTEMPT-LT USERS

10. REFERENCES (CONTINUED)
MANUAL, INTERIM REPORT I-214-74-12.1, AUGUST 1973.
L. L. WHEAT, CONTEMPT-LT/021 CONTAINMENT CODE - LLW-7-73, AEROJET NOTE, SEPTEMBER 6, 1973.
L. L. WHEAT, CONTEMPT-LT/022 PROGRAM AVAILABILITY - LLW-12-73, AEROJET NOTE, DECEMBER 17, 1973.

11. MACHINE REQUIREMENTS - 270K BYTES AND A CALCOMP PLOTTER USED FOR PLOTTING

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND BAL

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 MVT.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
R. J. WAGNER AND L. L. WHEAT
AEROJET NUCLEAR COMPANY
550 SECOND STREET
IDAHO FALLS, IDAHO 83401

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (CONTEMPT 5182 CARDS, NRTS ENVIRONMENTAL SUBROUTINES 12,195 CARDS)
LOAD MODULE CONTEMPT (IBM 2314 350 BLOCKS)
SAMPLE PROBLEM (60 CARDS)
CONTROL INFORMATION (JCL 52 CARDS)
SAMPLE PROBLEM OUTPUT (31 PAGES, 4 PLOTS)
REFERENCE REPORTS, PROGRAM MODIFICATION MEMORANDA, SUBROUTINE DESCRIPTIONS, INTERIM REPORT, AND AEROJET NOTES

17. CATEGORY - G
KEYWORDS - ACCIDENTS, TEMPERATURE DISTRIBUTION, PRESSURE DISTRIBUTION, CONTAINMENT, WATER, THERMODYNAMICS, LEAKAGE, HEAT TRANSFER, CONTEMPT CODES

1. NAME OR DESIGNATION OF PROGRAM - HEATMESH

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - HEATMESH IS USED TO GENERATE GEOMETRICAL DATA REQUIRED FOR STUDIES OF HEAT TRANSFER IN AXISYMMETRIC STRUCTURES REPRESENTED AS SURFACES OF REVOLUTION. THE PROGRAM CONSISTS OF TWO DISTINCT PHASES. THE FIRST SUBDIVIDES THE GIVEN PARTS INTO A NODAL NETWORK AND EVALUATES THE GEOMETRICAL PROPERTIES OF THE NODES. THE SECOND DETERMINES ADJACENT NODES AND EDITS GEOMETRICAL DATA FOR THE THERMAL MODEL.

4. METHOD OF SOLUTION - THE STRUCTURE TO BE STUDIED, REPRESENTED AS A BODY OF REVOLUTION, IS DIVIDED INTO PARTS HAVING COMMON MATERIAL PROPERTIES AND REPRESENTED AS BODIES OF REVOLUTION. EACH PART IS THEN DESCRIBED AS FOUR SURFACES OF REVOLUTION SUBDIVIDED INTO NODES WHICH FORM A MESH. DATA FOR EACH PART ARE COLLECTED, I.E. VOLUME, AREA, AND PART NUMBER OF EACH NODE, AND NODE SURFACES ON THE PART BOUNDARY AND INSIDE THE PART BOUNDARY. THE DISTANCE BETWEEN THE CENTER AND THE MIDPOINT OF EACH SURFACE OF THE NODE IS TABULATED ALSO.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -
   NUMBER OF SUBDIVISIONS BETWEEN 1 AND 50 FOR SIDES 1 AND 3
   NUMBER OF SUBDIVISIONS BETWEEN 1 AND 12 FOR SIDES 2 AND 4

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - THE INPUT DATA ARE CONSTRUCTED IN THE SAME MANNER AS USED IN THE APT PROGRAM. DATA GENERATED BY APT CAN BE USED IN HEATMESH WITH ONLY MINOR CHANGES.

8. RELATED AND AUXILIARY PROGRAMS - THE DATA GENERATED BY HEATMESH ARE USED IN THE DIFFERENCE EQUATIONS OF THE HEATFLOW PROGRAM WHICH SOLVES TRANSIENT HEAT TRANSFER PROBLEMS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
   CDC6600 VERSION SUBMITTED JANUARY 1970.

10. REFERENCES - V. K. GABRIELSON, HEATMESH, A COMPUTER CODE FOR GENERATING GEOMETRICAL DATA REQUIRED FOR STUDIES OF HEAT TRANSFER IN AXISYMMETRIC STRUCTURES, SCL-DR-67-30, SEPTEMBER 1967, AND ERRATA, 1970.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - ALL SUBROUTINES CALLED WHICH ARE NOT INCLUDED REFER TO SANDIA (LIVERMORE) PLOT PROGRAMS AND SHOULD BE EASILY CONVERTED TO OTHER SYSTEMS.

15. NAME AND ESTABLISHMENT OF AUTHOR -

V. K. GABRIELSON
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DIVISION 8321
SANDIA CORPORATION
LIVERMORE, CALIFORNIA 94550

16. MATERIAL AVAILABLE -
SOURCE DECK (1036 CARDS)
SAMPLE PROBLEM (36 CARDS)
REFERENCE REPORT AND ERRATA

17. CATEGORY - N
KEYWORDS - HEAT TRANSFER, GEOMETRIES, INPUT DATA, STRUCTURAL ANALYSIS

ACC ABSTRACT 435 07/74

1. NAME OR DESIGNATION OF PROGRAM - BURST1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/75

3. DESCRIPTION OF PROBLEM OR FUNCTION - BURST1 PROVIDES FOR THE STUDY OF PRESSURIZED LIQUID IN A CYLINDRICAL SYSTEM IMMEDIATELY AFTER A RUPTURE OCCURS AT ONE OR BOTH ENDS OF THE SYSTEM. PRESSURE, MASS VELOCITY, AND ENTHALPY ARE CALCULATED AT EQUALLY-SPACED MESH POINTS ALONG THE LENGTH OF THE SYSTEM. THIS IS A ONE-DIMENSIONAL REPRESENTATION, ASSUMING UNIFORM CONDITIONS THROUGHOUT ANY GIVEN CROSS-SECTIONAL AREA. FORCES ON DESIGNATED SECTIONS OF THE SYSTEM CAN ALSO BE COMPUTED, WITH PROVISION FOR DIRECTIONAL CHANGES.

4. METHOD OF SOLUTION - PARTIAL TIME DERIVATIVES FOR MASS VELOCITY, PRESSURE, AND ENTHALPY, OBTAINED FROM THE THREE CONSERVATION LAWS FOR MASS, MOMENTUM, AND ENERGY, ARE APPROXIMATED WITH DIFFERENCE EQUATIONS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   50 TOTAL CYLINDERS AND ADAPTERS
   2000 SPACE STEPS IN THE WHOLE SYSTEM
   5000 TIME-STEPS
   ONLY SUBCOOLED, FRICTIONLESS, ADIABATIC CASES CAN BE CONSIDERED.

6. TYPICAL RUNNING TIME - WITH A LARGE PROBLEM ON THE IBM7044, THE PRODUCT OF THE NUMBER OF SPACE STEPS AND THE NUMBER OF TIME-STEPS RUN IN ONE MINUTE IS ABOUT 25,000.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THE BLOT DECK IS USED TO PLOT DATA STORED BY BURST1.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
   IBM360 VERSION SUBMITTED FEBRUARY 1970, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - RONALD P. ROSE, GEORGE H. HANSON, AND GERALD A. JAYNE, HYDRODYNAMICS DESCRIBING ACOUSTIC PHENOMENA DURING REACTOR COOLANT SYSTEM BLOWDOWN, IDO-17254, JULY 1967.
    GERALD A. JAYNE, BURT 1 PROGRAM DESCRIPTION (P00410), DECEMBER 1967.

11. MACHINE REQUIREMENTS - 32K MEMORY

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE -

SOURCE DECKS (BURST1 360-612 CARDS, BLOT 360-240 CARDS)
SAMPLE PROBLEMS (BURST1 360-33 CARDS, BLOT 360-29 CARDS)
SAMPLE PROBLEM OUTPUT (8 PAGES)
REFERENCE REPORT AND PROGRAM DESCRIPTION

17. CATEGORY - G

KEYWORDS - CYLINDERS, PRESSURE DISTRIBUTION, 1-DIMENSIONAL, ENTHALPY, BLOWDOWN, HYDRODYNAMICS, COOLANTS, BLOT CODES

ACC ABSTRACT 436 02/72

1. NAME OR DESIGNATION OF PROGRAM - ETOM1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - ETOM1 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B FORMAT AND PRODUCES DATA DECKS FOR USE IN GENERATION OF MUFT4 AND MUFT5 LIBRARIES.

4. METHOD OF SOLUTION - BASICALLY, ETOM1 PERFORMS A STRAIGHTFORWARD GROUP AVERAGING OF THE VARIOUS CROSS SECTIONS USING THE INPUT WEIGHT AND THE MICROSCOPIC DATA FROM THE ENDF/B DATA FILES. THE BREIT-WIGNER SINGLE-LEVEL FORMULA IS ASSUMED TO YIELD RESONANCE CROSS SECTIONS WITH REASONABLE ACCURACY.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   99 MULTIGROUPS
   250 RESOLVED RESONANCES

6. TYPICAL RUNNING TIME - EXECUTION TIMES FOR A STANDARD 54-GROUP MUFT PROBLEM USING ENDF/B DATA WHICH CONTAIN EXPLICIT RESONANCE PARAMETERS VARY FROM 1 TO 2 MINUTES. WHEN THE ENDF/B DATA FOR THE ISOTOPE DOES NOT CONTAIN EXPLICIT RESONANCE PARAMETERS, EXECUTION TIMES VARY FROM .5 TO 1 MINUTE.

7. UNUSUAL FEATURES OF THE PROGRAM - THE GENERAL PURPOSE RETRIEVAL SUBROUTINES ENABLE TWO TABULAR FUNCTIONS TO BE ACCURATELY COMBINED (TO WITHIN SOME INPUT EPSILON) AND THEY ALSO PROVIDE FOR EXACT (ACCORDING TO THE SPECIFIED INTERPOLATION SCHEMES) INTEGRATION OF THE FUNCTIONS. ANY DESIRED WEIGHTING SCHEME MAY BE USED. ETOM1 WILL ACCEPT ENDF/B DATA FROM A BINARY TAPE OR FROM A BCD CARD IMAGE TAPE OR JUST FROM BCD CARDS. ALL DATA IS ASSUMED TO BE IN THE STANDARD ENDF/B ARRANGEMENT. MANY OF THE SUBROUTINES USED BY THE PROGRAM MAY BE USEFUL IN OTHER (PRESENT AND FUTURE) CODES CONNECTED WITH THE ENDF/B SYSTEM.

8. RELATED AND AUXILIARY PROGRAMS - STORAGE AND RETRIEVAL OF THE ENDF/B MICROSCOPIC DATA AND COMBINATION OF TWO OR MORE TABULAR ARRAYS INTO ONE TABULAR ARRAY WITH ONE INTERPOLATION SCHEME IS ACCOMPLISHED IN LARGE PART BY THE GENERAL PURPOSE RETRIEVAL SUBROUTINES (ACC ABSTRACT 384).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
   CDC6600 VERSION SUBMITTED FEBRUARY 1970.

10. REFERENCES - R. A. DANNELS AND D. E. KUSNER, ETOM-1 - A FORTRAN PROGRAM TO PROCESS DATA FROM THE ENDF/B FILE TO THE MUFT FORMAT, WCAP-3688-1, MAY 1968.
    H. C. HONECK, ENDF/B - SPECIFICATIONS FOR AN EVALUATED NUCLEAR DATA FILE FOR REACTOR APPLICATIONS, BNL-50066, MAY 1966, REVISED JULY 1967.
    H. BOHL, JR., E. M. GELBARD, AND G. H. RYAN, MUFT-4

8. RELATED AND AUXILIARY PROGRAMS - THE CRECT CODE WAS USED TO MAKE THE NECESSARY ALTERATIONS TO THE ENDF/B TAPES. THE DATA DECKS WERE CREATED FOR THE MUFT4, MUFT5, GAM1 (ACC ABSTRACT 33), AND GAM2 PROGRAMS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
CDC6600 VERSION SUBMITTED FEBRUARY 1970.

10. REFERENCE - S. KELLMAN AND D. E. KUSNER, DESCRIPTION OF THE GENERATION OF DATA DECKS BY ETOG-1 FOR USE IN CREATING MUFT AND GAM LIBRARIES, WCAP-3845-2 (ENDF-133), JANUARY 1970.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED -

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED -

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
S. KELLMAN AND D. E. KUSNER
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL (5 TAPES)
MUFT4 (1 TAPE 59 FILES)
MUFT5 (1 TAPE 59 FILES)
GAM1 (1 TAPE 47 FILES)
GAM2 (2 TAPES TAPE1-25 FILES, TAPE2-23 FILES)
REFERENCE REPORT

17. CATEGORY - Z
KEYWORDS - CROSS SECTIONS, LIBRARIES, MUFT4 CODES, MUFT5 CODES, GAM1 CODES, GAM2 CODES, ETOG CODES, CRECT CODES

1. NAME OR DESIGNATION OF PROGRAM - FLASH4

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600, IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - FLASH4 IS USED TO DETERMINE THE TRANSIENT RESPONSE OF A WATER-COOLED REACTOR OR HYDRAULIC SYSTEM TO SEVERE VARIABLE PRESSURE OPERATION.

4. METHOD OF SOLUTION - THE NUMERICAL INTEGRATIONS OF THE COUPLED FLUID CONSERVATION EQUATIONS ARE DONE BY FULLY IMPLICIT DIFFERENCE EQUATIONS. FLUID PROPERTIES ARE GENERATED FROM STORED DATA.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   20 PRESSURE DETERMINING NODES
   40 FLOW PATHS
   THE PLANT AND CORE GEOMETRY ARE ASSUMED FIXED IN TIME, HENCE THE SOLUTION IS NOT APPLICABLE AFTER SIGNIFICANT DIMENSIONAL CHANGE.

6. TYPICAL RUNNING TIME - RUNNING TIME VARIES BETWEEN .001 TO 100 TIMES REAL TIME, DEPENDING ON THE TYPE OF THE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - FLASH4 CAN BE APPLIED TO ANY WATER-COOLED REACTOR GEOMETRY OR PLANT CONFIGURATION. IT INCLUDES ACOUSTIC EFFECTS FOR BOTH SUBCOOLED AND SATURATED BLOWDOWNS. THE NUMERICAL TECHNIQUES OF FLASH4 RESULT IN SHORTER RUNNING TIME FOR THE LONG-TERM SOLUTIONS OF SLOWLY VARYING TRANSIENTS, E.G. SMALL LEAKS.

8. RELATED AND AUXILIARY PROGRAMS - FLASH4 IS AN EXTENSION OF FLASH AND FLASH2 (ACC ABSTRACT 295). FLASH4 USES THE INPUT PROCESSING SUBROUTINES FCHIP, CARDS, AND INPF (SEE REFERENCE 4 AND ACC ABSTRACT 478). THE IBM360 VERSION OF FLASH4 USES THE ENVIRONMENTAL ROUTINES WHICH WERE CONVERTED FOR THE IBM360 VERSION OF PDQ7 (ACC ABSTRACT 275).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
   CDC6600 VERSION SUBMITTED JANUARY 1970.
   IBM360 VERSION SUBMITTED AUGUST 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - T. A. PORSCHING, J. H. MURPHY, J. A. REDFIELD, AND V. C. DAVIS, FLASH-4, A FULLY-IMPLICIT FORTRAN IV PROGRAM FOR THE DIGITAL SIMULATION OF TRANSIENTS IN A REACTOR PLANT, WAPD-TM-840, MARCH 1969.

J. A. REDFIELD, J. H. MURPHY, V. C. DAVIS, FLASH-2, A FORTRAN IV PROGRAM FOR THE DIGITAL SIMULATION OF A MULTINODE REACTOR PLANT DURING LOSS-OF-COOLANT, WAPD-TM-666, APRIL 1967.

S. G. MARGOLIS AND J. A. REDFIELD, FLASH, A PROGRAM FOR DIGITAL SIMULATION OF THE LOSS-OF-COOLANT ACCIDENT, WAPD-TM-534, MAY 1966.

C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS

10. REFERENCES (CONTINUED)
ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1967.
IBM360/370 FLASH4 REACTOR TRANSIENTS SIMULATION PROGRAM LISTING, MDC N2267-094, VOLUMES 1 AND 2, JULY 1974.

11. MACHINE REQUIREMENTS - 64K MEMORY (CDC6600), 250K BYTES (IBM360)

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE (CDC6600), OS/360,370 (IBM360,370).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - ALL THE FLASH4 SUBROUTINES WERE CONVERTED TO THE IBM360 EXCEPT THE PLOTTING ROUTINES. HOWEVER, ALL REFERENCES TO THE PLOTTING WERE LEFT INTACT SO THAT ANYONE WISHING TO ADD THIS FEATURE WILL FIND IT LESS DIFFICULT.

15. NAME AND ESTABLISHMENT OF AUTHORS -
6600 T. A. PORSCHING, J. H. MURPHY, J. A. REDFIELD, AND V. C. DAVIS
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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (6600-11,598 CARDS, 360-15,907 CARDS)
SAMPLE PROBLEMS (6600-24 CARDS, 360-23 CARDS)
SAMPLE PROBLEM OUTPUT (6600-25 SELECTED PAGES)
CONTROL INFORMATION (JCL 360-78 CARDS)
2314 LOAD MODULE FLASH (360-320 BLOCKS)
REFERENCE REPORTS, WAPD-TM-840, WAPD-TM-666, WAPD-TM-668, MDC N2267-094, VOLS. 1, 2 (360 VERSION ONLY)

17. CATEGORY - G
KEYWORDS - REACTORS, TRANSIENTS, ACCIDENT, CONTAINMENT, FUELS, FLUID FLOW, PRESSURE DISTRIBUTION, COOLANTS, BLOWDOWN, REACTOR SAFETY, FLASH CODES

1. NAME OR DESIGNATION OF PROGRAM - CYGRO3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - CYGRO3 IS AN EXTENSIVE MODIFICATION OF CYGRO1 AND CYGRO2 (ACC ABSTRACT 266). BASICALLY THE PROGRAM CALCULATES TEMPERATURES, DEFORMATION, AND STRESSES IN CLADDED FUEL RODS AS A FUNCTION OF A HISTORY OF POWER AND COOLANT CONDITIONS. AXIAL AND CIRCUMFERENTIAL UNIFORMITY ARE ASSUMED. BUBBLE GROWTH AND MIGRATION ARE INCLUDED. THE MAIN CHANGES FROM CYGRO1 AND CYGRO2 ARE IN THE AREA OF VOID MIGRATION, FUEL CRACKING, CLAD COLLAPSE, REPRESENTATION OF IN-PILE CREEP AND CLAD ANISOTROPY.

4. METHOD OF SOLUTION - THE FUEL AND CLAD ARE DIVIDED INTO A NUMBER OF CONCENTRIC RINGS. EQUATIONS FOR BALANCE OF FORCES AND DISPLACEMENTS BETWEEN THE RINGS ARE USED TO ESTABLISH EQUILIBRIUM. PLASTIC FLOW (CREEP) IS TREATED ON AN INCREMENTAL BASIS. THE REQUIRED SIZES OF TIME-STEPS ARE CALCULATED INTERNALLY ON THE BASIS OF ALLOWED STRESS AND STRAIN INCREMENTS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMUM OF - 30 RINGS (FUEL PLUS CLAD)

6. TYPICAL RUNNING TIME - EACH BASIC TIME-STEP TAKES ABOUT 0.01 SECOND PER FUEL RING (I.E. 0.1 SECOND FOR 10 RINGS). THE NUMBER OF TIME-STEPS PER HISTORY INPUT STEP VARIES BETWEEN 50 AND 500.

7. UNUSUAL FEATURES OF THE PROGRAM - BENDING MOMENTS TO HOLD THE FUEL ROD STRAIGHT WHEN SITUATED IN A POWER GRADIENT ARE CALCULATED BY A PERTURBATION ANALYSIS. CORRESPONDING DEFLECTIONS IF ALLOWED TO GO FREE ARE ALSO DETERMINED. AXIAL FORCES PRODUCED BY SUPPORTS CAN BE FACTORED INTO THE CALCULATIONS. THE EFFECT OF A CENTRAL HEAT PRODUCING PLUG INSIDE THE FUEL CAN BE CALCULATED. CLAD COLLAPSE PRESSURES CAN BE SPECIFIED AS A FUNCTION OF TIME.

8. RELATED AND AUXILIARY PROGRAMS - CYGRO1 AND CYGRO2. CYGRO3 USES THE BETTIS ENVIRONMENTAL ROUTINES (ACC ABSTRACT 478).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1970.
CDC6600 VERSION SUBMITTED JULY 1970, REPLACED BY CORRECTED VERSION AUGUST 1971.

10. REFERENCES - E. DUNCOMBE AND C. M. FRIEDRICH, CYGRO-3 - A COMPUTER PROGRAM TO DETERMINE TEMPERATURES, STRESSES AND DEFORMATIONS IN OXIDE FUEL RODS (LWBR DEVELOPMENT PROGRAM), WAPD-TM-961, MARCH 1970.

C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1967.

ACC PROGRAMMING NOTE 73-4, AUGUST 28, 1972.

11. MACHINE REQUIREMENTS - 140,000 OCTAL WORDS

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - CYGRO3 CALLS A SUBROUTINE TICK WHICH IS NOT INCLUDED WITH THE PROGRAM NOR WITH THE BETTIS ENVIRONMENTAL ROUTINES. THEREFORE, THE USER WILL HAVE TO PROVIDE HIS OWN SUBROUTINE TICK. CALL TICK(HRS) IS USED TO OBTAIN ELAPSED TIME FOR THE CURRENT JOB. IT SETS HRS (REAL) TO THE ELAPSED CHARGE TIME IN HOURS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (5206 CARDS)
SAMPLE PROBLEM (95 CARDS)
SAMPLE PROBLEM OUTPUT (15 PAGES)
REFERENCE REPORTS

17. CATEGORY - I
KEYWORDS - STRESSES DISTRIBUTION, FUEL ELEMENTS, DEFORMATION, TEMPERATURE, PRESSURE, CYGRO CODES

1. NAME OR DESIGNATION OF PROGRAM - KENO/KENO2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360, CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - KENO IS A MULTIGROUP MONTE CARLO CRITICALITY CODE CONTAINING A SPECIAL GEOMETRY PACKAGE WHICH ALLOWS EASY DESCRIPTION OF SYSTEMS COMPOSED OF CYLINDERS, SPHERES, AND CUBOIDS (RECTANGULAR PARALLELEPIPEDS) ARRANGED IN ANY ORDER WITH ONLY ONE RESTRICTION (EACH GEOMETRICAL REGION MUST BE DESCRIBED AS COMPLETELY ENCLOSING ALL REGIONS INTERIOR TO IT). FOR SYSTEMS NOT DESCRIBABLE USING THIS SPECIAL GEOMETRY PACKAGE, THE PROGRAM CAN USE THE GENERALIZED GEOMETRY PACKAGE (GEOM) DEVELOPED FOR THE O5R MONTE CARLO CODE. IT ALLOWS ANY SYSTEM THAT CAN BE DESCRIBED BY A COLLECTION OF PLANES AND/OR QUADRATIC SURFACES, ARBITRARILY ORIENTED AND INTERSECTING IN ARBITRARY FASHION. RECTANGULAR ARRAYS OF FISSILE UNITS ARE ALLOWED WITH OR WITHOUT EXTERNAL REFLECTOR REGIONS. OUTPUT FROM KENO CONSISTS OF KEFF FOR THE SYSTEM PLUS AN ESTIMATE OF ITS STANDARD DEVIATION AND THE LEAKAGE, ABSORPTION, AND FISSIONS FOR EACH ENERGY GROUP PLUS THE TOTALS FOR ALL GROUPS. FLUX AS A FUNCTION OF ENERGY GROUP AND REGION AND FISSION DENSITIES AS A FUNCTION OF REGION ARE OPTIONAL OUTPUT.

4. METHOD OF SOLUTION - THE SCATTERING TREATMENT USED IN KENO ASSUMES THAT THE DIFFERENTIAL NEUTRON SCATTERING CROSS SECTION CAN BE REPRESENTED BY A P1 LEGENDRE POLYNOMIAL. ABSORPTION OF NEUTRONS IN KENO IS NOT ALLOWED. INSTEAD, AT EACH COLLISION POINT OF A NEUTRON TRACKING HISTORY THE WEIGHT OF THE NEUTRON IS REDUCED BY THE ABSORPTION PROBABILITY. WHEN THE NEUTRON WEIGHT HAS BEEN REDUCED BELOW A SPECIFIED POINT FOR THE REGION IN WHICH THE COLLISION OCCURS, RUSSIAN ROULETTE IS PLAYED TO DETERMINE IF THE NEUTRONS HISTORY IS TO BE TERMINATED AT THAT POINT OR IF THE NEUTRON IS TO SURVIVE WITH AN INCREASED WEIGHT. SPLITTING OF HIGH WEIGHT NEUTRONS IS ALLOWED IN ORDER TO MINIMIZE THE VARIANCE IN KEFF FOR SYSTEMS WITH REGIONS OF WIDELY VARYING AVERAGE WEIGHTS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - THE FIRST KENO SAMPLE PROBLEM REQUIRES JUST OVER 2 MINUTES OF EXECUTION TIME ON THE IBM360/91 AND 6 MINUTES ON THE IBM360/75. TYPICAL PROBLEMS RUN BETWEEN 2 AND 30 MINUTES ON THE CDC6600, DEPENDING ON THE NUMBER OF HISTORIES REQUESTED, THE STATISTICAL WEIGHTING USED, AND THE PRESENCE OR ABSENCE OF REFLECTORS. RUNNING TIME FOR THE IBM360 VERSION OF KENO2 DEPENDS ON THE PROBLEM AND NUMBER OF HISTORIES. FOR UNMODERATED METAL ARRAYS APPROXIMATELY 3 MINUTES ARE REQUIRED ON AN IBM360/65. FOR A MODERATED SYSTEM, APPROXIMATELY 15 TO 30 MINUTES GIVE ADEQUATE STATISTICS.

7. UNUSUAL FEATURES OF THE PROGRAM - THE MIXED BOX FEATURE PERMITS THE CALCULATION OF MANY DIFFERENT TYPES OF UNITS. KENO2 (CDC6600)

7. UNUSUAL FEATURES OF THE PROGRAM (CONTINUED)
INPUT IS EXTENSIVELY CHECKED FOR CONSISTENCY AND COMPLETENESS. FOR THE IBM360 VERSION OF KENO2 A SIMPLIFIED GEOMETRY DESCRIPTION IS PERMITTED WHEN NO SURFACES INTERSECT.

8. RELATED AND AUXILIARY PROGRAMS - ANISN (ACC ABSTRACT 151), DOT, GECM, O5R. THE 6600 VERSION INCLUDES AN AUXILIARY PROGRAM, K2TAPE, TO READ THE CROSS SECTION LIBRARY DATA AND CREATE A BINARY FILE TO BE READ BY KENO2.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1972.
IBM360 VERSION OF KENO SUBMITTED MAY 1970, REPLACED BY SECOND EDITION SEPTEMBER 1971, SAMPLE PROBLEM EXECUTED BY ACC.
CDC6600 VERSION OF KENO2 SUBMITTED JULY 1973, LIBRARY AND AUXILIARY PROGRAM ADDED AUGUST 1974.
IBM360 VERSION OF KENO2 SUBMITTED AUGUST 1973, REVISED APRIL 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - G. E. WHITESIDES AND N. F. CROSS, KENO - A MULTIGROUP MONTE CARLO CRITICALITY PROGRAM, CTC-5, SEPTEMBER 10, 1969.
KENO DATA GUIDE, CTC-5 ERRATA PP.21-32, SEPTEMBER 1971.
DESCRIPTION OF ALBEDO AND CROSS SECTION DATA, ORNL NOTE, SEPTEMBER 1971.
ACC PROGRAMMING NOTE, KENO TAPE SETUP, JANUARY 1972.
DEANNE DICKINSON, ROCKY FLATS KENO II MANUAL, APRIL 1973.
ACC 450 KENO2 CDC6600 PROGRAMMING NOTES, JULY 1973.
KENO2, ACC NO. 450.360B, ARGONNE CODE CENTER PROGRAMMING NOTE 74-26, MARCH 6, 1974.
H. K. CLARK, KENO-II MEMORANDUM, DPST-70-449 (REVISED), AUGUST 1, 1973.
KENO2, 450.6600, TAPE DESCRIPTION, ARGONNE CODE CENTER PROGRAMMING NOTE 75-21, JANUARY 1975.

11. MACHINE REQUIREMENTS - CDC6600 PROGRAM REQUIRES 64K WORDS OF FAST CORE, A DISK FACILITY OR ONE OR MORE TAPE UNITS. IBM360 VERSION OF KENO2 REQUIRES APPROXIMATELY 150K OF CORE WITH LARGER PROBLEMS REQUIRING MORE CORE.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASSEMBLY LANGUAGE (IBM360), FTN FORTRAN WITH COMPASS SUBROUTINES (CDC6600)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360) AND SCOPE 3.3 (CDC6600).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - IBM360 KENO SAMPLE PROBLEM CAN BE EXECUTED BY MOUNTING THE DISTRIBUTION TAPE AND USING THE JCL CARDS TO RETRIEVE THE OBJECT PROGRAM AND ANY NEEDED CROSS SECTION OR ALBEDO DATA. THE ENCLOSED CROSS SECTION AND ALBEDO DATA ARE INCLUDED FOR THE SOLE PURPOSE OF ALLOWING THE SAMPLE PROBLEMS TO BE RUN FOR INSTRUCTIONAL PUR-

14. ANY OTHER INFORMATION OR RESTRICTIONS (CONTINUED)
POSES AND SHOULD NOT BE ASSUMED USEFUL FOR ANY OTHER PURPOSE WITHOUT CLOSE EXAMINATION AS TO THEIR APPLICABILITY.

THE ASSEMBLER LANGUAGE SUBROUTINES MENTIONED IN ITEM 12 INCLUDE A RANDOM NUMBER PACKAGE RANDNUM (ENTRIES FLTRN, AZIRN, EXPRN, AND GTISO), A TIMING SUBROUTINE PULL (ENTRIES PULL AND ITIME), AND MODEL, A SUBROUTINE USED AT OAK RIDGE TO IDENTIFY THE MACHINE ON WHICH A PROBLEM IS BEING RUN.

15. NAME AND ESTABLISHMENT OF AUTHORS -

360 KENO G. E. WHITESIDES AND N. F. CROSS
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6600 KENO2 DEANNE DICKINSON
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360 KENO2 H. K. CLARK
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AIKEN, SOUTH CAROLINA 29801

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (KENO 360-5230 CARDS, KENO2 6600-5109 CARDS, 360-5408 CARDS)
AUXILIARY PROGRAM SOURCE DECK (K2TAPE 6600-77 CARDS)
OBJECT DECKS (KENO 360-3347 CARDS, KENO2 360-78 CARDS)
2314 LOAD MODULE (KENO2 360-312 BLOCKS)
SAMPLE PROBLEMS (KENO 360-1664 CARDS, KENO2 6600-369 CARDS, 360-569 CARDS)
LIBRARIES (KENO 360-CROSS SECTIONS 110 VARIABLE-SIZED BINARY RECORDS, ALBEDOS 39 VARIABLE-SIZED BINARY RECORDS, KENO2 6600-7725 CARDS)
CONTROL INFORMATION (KENO 360-29 CARDS, KENO2 360-43 CARDS)
SAMPLE PROBLEM OUTPUT (360-110 SELECTED PAGES, 6600-58 PAGES)
REFERENCE REPORT, ERRATA, MANUAL, NOTES, AND MEMO

17. CATEGORY - C
KEYWORDS - MULTIGROUP, MONTE CARLO METHOD, CRITICALITY, LEAKAGE, ABSORPTION, FISSION, STATISTICS, ANISN CODES, DOT CODES, GEOM CODES, D5R CODES, K2TAPE CODES

1. NAME OR DESIGNATION OF PROGRAM - BETTIS ENVIRONMENTAL ROUTINES: MODEL6/3.2,MODEL6/3.3,MODEL7/2.0

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600,7600

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE BETTIS ENVIRONMENTAL ROUTINES EXTEND THE FORTRAN LANGUAGE BY MODIFYING SOME OF THE STANDARD CDC6600 LIBRARY ROUTINES AND BY ADDING ROUTINES TO THE LIBRARY TO FACILITATE DECIMAL INPUT AND OUTPUT, FILE MAINTENANCE, SCRATCH I/O, STORAGE ALLOCATION, UTILITY FUNCTIONS, OPERATING SYSTEM INTERFACING, AND OPERATOR COMMUNICATION.
   MODEL (MODIFIED ENVIRONMENTAL LIBRARY) DIFFERS FROM THE ORIGINAL BETTIS VERSION IN THAT IT ALLOWS THE OPERATING SYSTEM, RATHER THAN THE ENVIRONMENTAL PACKAGE, TO CONTROL THE OPERATING ENVIRONMENT.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THE BETTIS ENVIRONMENTAL ROUTINES AND MODEL ARE USED BY MOST OF THE BETTIS PROGRAMS. HOWEVER, MODEL INCLUDES ONLY FILE HANDLING AND STORAGE ALLOCATION FACILITIES.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1972.
   CDC6600 BETTIS SCOPE 2 VERSION SUBMITTED JANUARY 1967.
   CDC6600 BABCOCK & WILCOX SCOPE 3.1 VERSION SUBMITTED FEBRUARY 1970, UPDATED SCOPE 3.3 SUBROUTINES ADDED OCTOBER 1971.
   CDC6600 MODEL SCOPE 3.1 VERSION SUBMITTED JUNE 1970, REPLACED BY SCOPE 3.2 VERSION NOVEMBER 1971.
   CDC6600 MODEL SCOPE 3.3 VERSION SUBMITTED DECEMBER 1971.
   CDC7600 MODEL SCOPE 2.0 VERSION SUBMITTED MAY 1972, REPLACED BY REVISED EDITION MARCH 1974.

10. REFERENCES - C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1967.
   R. S. HORECK, L. A. BOELTER, AND R. W. MORSTAD, MODEL - MODIFIED ENVIRONMENTAL LIBRARY, CDC-6600 FORTRAN PROGRAMMING GUIDE, CDC REPORT, SEPTEMBER 1971.
   B. W. YEATTS, R. S. HORECK, L. A. BOELTER, AND R. W. MORSTAD, MODEL - MODIFIED ENVIRONMENTAL LIBRARY, VERSION 6/3.2 INSTALLATION GUIDE, CDC REPORT, NOVEMBER 1971.
   B. W. YEATTS AND L. A. BOELTER, MODEL - MODIFIED ENVIRONMENTAL LIBRARY, VERSION 6/3.3 INSTALLATION GUIDE, CDC REPORT, DECEMBER 1971.

10. REFERENCES (CONTINUED)

L. A. BOELTER, MODEL - MODIFIED ENVIRONMENTAL LIBRARY, CDC-7600 FORTRAN PROGRAMMING GUIDE, CDC REPORT, MAY 1972.

L. A. BOELTER, MODEL - MODIFIED ENVIRONMENTAL LIBRARY, VERSION 7/2.0 INSTALLATION GUIDE, CDC REPORT, MAY 1972.

REVISED MODEL ROUTINES CDC7000, COMBUSTION ENGINEERING INTERNAL MEMORANDUM, MARCH 1974.

11. MACHINE REQUIREMENTS - FOR THE BETTIS VERSION 65,356 WORDS OF 60-BIT CORE STORAGE (MORE OR LESS CAN BE USED), A SYSTEM (6603) DISK, AT LEAST 2 MAGNETIC TAPES, AT LEAST 4 NON-SYSTEM DISKS, EACH ON ITS OWN CHANNEL, AND CDC-280 PLOTTING HARDWARE.

FOR THE MODEL VERSIONS 65,356 WORDS OF 60-BIT CORE STORAGE (MORE CAN BE USED), 2 MAGNETIC TAPES, AND 4 MASS STORAGE DEVICES, EACH ON ITS OWN CHANNEL.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASCENT (BETTIS AND B&W), FORTRAN IV AND COMPASS (MODEL 6/3.2 AND 3.3), FORTRAN IV (MODEL 7/2.0)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 2.0 (BETTIS), SCOPE 3.1 (B&W), SCOPE 3.2 (MODEL), SCOPE 3.3 (MODEL), SCOPE 2.0 (MODEL 7/2.0).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE OPERATING SYSTEMS TO BE ENHANCED BY MODEL 6/3.2, MODEL 6/3.3, AND MODEL 7/2.0 ARE CDC6600 SCOPE3.2 AND SCOPE 3.3 AND CDC7600 SCOPE 2.0, RESPECTIVELY. THE USER MUST PROVIDE A SITE-CONFIGURED SCOPE 3.2, SCOPE 3.3, OR SCOPE 2.0 SOURCE CODE FILE, IN UPDATE PROGRAM LIBRARY FORMAT. UPDATE IS THE SCOPE SOURCE LANGUAGE LIBRARY MAINTENANCE PROGRAM, AS DOCUMENTED IN THE SCOPE REFERENCE MANUAL. AS A RESULT OF THE INSTALLATION PROCEDURE, A SCOPE 3.2, SCOPE 3.3, OR SCOPE 2.0 DEADSTART TAPE WITH MODEL ROUTINES AND A CORRESPONDING SOURCE CODE FILE WILL BE PRODUCED. THE MODEL 6/3.2 AND 3.3 FORTRAN-CODED ROUTINES MUST BE COMPILED USING THE RUN COMPILER OR VARIATIONS THEREOF (E.G., FUN-53), WHILE THE MODEL 7/2.0 FORTRAN-CODED ROUTINES USE THE FTN COMPILER. THE COMPASS-CODED ROUTINES MUST BE ASSEMBLED USING THE COMPASS 2.0 ASSEMBLER.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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B&W M. L. DECH AND R. W. MCCRANEY
CONTROL DATA CORPORATION
G. R. POETSCHAT AND G. L. RUSSELL
POWER GENERATION DIVISION
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LYNCHBURG, VIRGINIA 24505

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)

MODEL B. W. YEATTS, R. S. HORECK, L. A. BOELTER, AND R. W. MORSTAD
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MODEL 7000 REVISED ROBERT KIRKMAN
COMBUSTION ENGINEERING, INC.
P. O. BOX 500
WINDSOR, CONNECTICUT 06095

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (BETTIS 21,123 CARDS, B&W 21,258 CARDS, B&W SCOPE 3.3 ROUTINES 444 CARDS, MODEL 6/3.2 1054 BCD RECORDS, MODEL 6/3.3 1022 BCD RECORDS, REVISED MODEL 7/2.0 18,889 CARDS)
REFERENCE REPORTS

17. CATEGORY - P
KEYWORDS - DATA PROCESSING OPERATION, LIBRARIES, MAINTENANCE

1. NAME OR DESIGNATION OF PROGRAM - FREADM1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - GE635

3. DESCRIPTION OF PROBLEM OR FUNCTION - FREADM1 IS A FAST REACTOR MULTICHANNEL ACCIDENT ANALYSIS PROGRAM DESIGNED TO EFFICIENTLY SIMULATE A REACTOR TRANSIENT FROM INITIATION TO THE POINT OF CORE DISASSEMBLY. MODELS ARE INCLUDED FOR NUCLEAR KINETICS (POINT MODEL), CORE THERMO-HYDRALLICS, VOIDING, FUEL REDISTRIBUTION, FAILURE PROPAGATION, PROGRAMMED REACTIVITY INSERTION, AND THE DYNAMICS OF PRIMARY SYSTEM COOLANT FLOW. A BROAD RANGE OF ASSUMED ACCIDENT INITIATING AND PROPAGATING ACTIVITIES MAY BE SIMULATED USING TRIGGERING LOGIC INCLUDED IN THE CODE.

4. METHOD OF SOLUTION - TIME INTEGRATION OF THE EQUATIONS FOR THE DYNAMICS OF NUCLEAR KINETICS, HEAT TRANSFER AND PRIMARY LOOP COOLANT FLOW MAY BE PERFORMED IN A COUPLED MODE, OR INDEPENDENTLY. TRANSIENT TEMPERATURE CONDITIONS COMPUTED FOR SINGLE PINS, REPRESENTATIVE OF A NUMBER OF BUNDLE TYPES, MAY BE USED TO INITIATE PRESCRIBED ACCIDENT INITIATING AND/OR PROPAGATING ACTIVITIES. THE USER SUPPLIES CRITERIA FOR INITIATING THESE ACTIVITIES. REACTIVITY FEEDBACK FROM THE VARIOUS ACTIVITIES MAY BE COMPUTED USING MODELS IN THE CODE, OR INPUT FROM TABLES.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - FREADM1 IS RESTRICTED TO ACCIDENTS WHICH INITIATE AND PROPAGATE UNIFORMLY WITHIN ANNULAR OR CYLINDRICAL COAXIAL CORE REGIONS.
   HEAT TRANSFER CALCULATIONS FOR UP TO 12 RADIAL CORE REGIONS MAY BE PERFORMED SIMULTANEOUSLY WITH UP TO 12 SEPARATE BUNDLE TYPES SUBDIVIDED INTO 9 OR LESS AXIAL SECTIONS. RADIAL HEAT TRANSFER CALCULATIONS ARE DONE USING UP TO 10 RADIAL FUEL NODES, A CLAD NODE AND A COOLANT NODE FOR EACH AXIAL SECTION. LOOP FLOW MAY BE TREATED USING A MAXIMUM OF 2 INDEPENDENT PRIMARY COOLANT LOOPS (LOOPS MAY BE OF DIFFERENT SIZES TO SIMULATE MORE THAN 2 LOOPS). POINT KINETICS WITH UP TO 6 DELAYED NEUTRON PRECURSER GROUPS IS USED TO COMPUTE THE TRANSIENT POWER LEVEL OF THE CORE.

6. TYPICAL RUNNING TIME - RUNNING TIME FOR FREADM1 IS STRONGLY DEPENDENT ON THE OPTIONS UTILIZED AND VALUES SUPPLIED FOR TIME-STEP CONTROL. 200 KINETICS TIME-STEPS WITH DOPPLER FEEDBACK FOR 12 BUNDLE TYPES, 9 AXIAL SECTIONS REQUIRE ABOUT .9 MINUTES OF GE635 PROCESSOR TIME. 87 COUPLED KINETICS AND HEAT TRANSFER TIME-STEPS USING 12 BUNDLE TYPES AND 9 AXIAL SECTIONS REQUIRE ABOUT 4.4 MINUTES OF GE635 PROCESSORE TIME. 32 COUPLED LOOP FLOW, KINETICS AND HEAT TRANSFER TIME-STEPS USING 12 BUNDLE TYPES AND 9 AXIAL SECTIONS REQUIRE ABOUT 5 MINUTES OF GE635 PROCESSOR TIME. COMPUTATION TIME PER TIME-STEP FOR HEAT TRANSFER CALCULATIONS IS PROPORTIONAL TO NBT * NAX WHERE NBT = NUMBER OF BUNDLE TYPES AND NAX = NUMBER OF AXIAL SECTIONS. COMPUTATION TIME PER TIME-STEP FOR AN INDEPENDENT LOOP FLOW AND VOIDING CALCULATIONS IS ABOUT 15 SECONDS OF GE635 PROCESSOR TIME.

1. NAME OR DESIGNATION OF PROGRAM - STEAM-67

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - STEAM-67 IS A SET OF ROUTINES FOR CALCULATING THE PROPERTIES OF STEAM AND WATER ACCORDING TO THE ASME STEAM TABLES, 1967, WHICH HAVE BEEN MODIFIED IN ACCORDANCE WITH THE ASME PAPER (REFERENCE 3). MODIFICATIONS WERE MADE TO IMPROVE PROGRAM RUNNING TIME AS WELL AS TO CORRECT SOME EXISTING PROGRAM ERRORS. CORRECTIONS WERE ALSO MADE TO ROUTINES FOR THE LIQUID REGION TO IMPROVE ACCURACY ON THE IBM360 COMPUTER.

4. METHOD OF SOLUTION - FOR THE USUAL CASE, WHERE PRESSURE AND/OR TEMPERATURE ARE KNOWN, THE VISCOSITY, SPECIFIC VOLUME, ENTHALPY OR ENTROPY MAY BE CALCULATED IN EITHER THE LIQUID OR VAPOR REGIONS. IN THE VAPOR REGION, QUALITY MAY BE CALCULATED AS A FUNCTION OF PRESSURE AND ENTROPY OR ENTHALPY.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1972.
IBM360 VERSION SUBMITTED JUNE 1970, REPLACED BY REVISED EDITION B JANUARY 1974.

10. REFERENCES - R. J. SPITZNAS, STEAM-67 TABLES, BALTIMORE GAS AND ELECTRIC NOTE, MAY 18, 1970.
C. A. MEYER, ET AL., THERMODYNAMIC AND TRANSPORT PROPERTIES OF STEAM, COMPRISING TABLES AND CHARTS FOR STEAM AND WATER, NEW YORK, 1967.
R. B. MCCLINTOCK AND G. J. SILVESTRI, SOME IMPROVED STEAM PROPERTY CALCULATION PROCEDURES, TRANSACTIONS OF THE ASME, VOL.92, PP.123-134, APRIL 1970.
R. B. MCCLINTOCK AND G. J. SILVESTRI, FORMULATIONS AND ITERATIVE PROCEDURES FOR THE CALCULATION OF PROPERTIES OF STEAM, ASME PUBLICATION (H-17), 1968.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV(G)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - DUE TO PRECISION REQUIREMENTS, ALL SUBPROGRAMS ARE WRITTEN IN

14. ANY OTHER INFORMATION OR RESTRICTIONS (CONTINUED)
DOUBLE-PRECISION. HOWEVER, ARGUMENTS ARE TRANSMITTED TO AND FROM CALLING PROGRAMS IN STANDARD PRECISION. BECAUSE OF THIS INTERFACE BETWEEN STANDARD AND DOUBLE-PRECISION, THE USER IS CAUTIONED TO ADHERE STRICTLY TO THE LISTED CALLS AND PARAMETERS AND NOT TO USE ANY OTHER AVAILABLE ENTRY POINTS. AN ERROR-HANDLING ROUTINE IS INCLUDED AS PART OF THE PACKAGE. IT WILL DOCUMENT NON-CONVERGENCE OR ARGUMENTS OUT OF ACCEPTABLE RANGE, LISTING THE CALLING ROUTINE AND ITS ARGUMENTS.

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (2408 CARDS)
REFERENCE NOTE, TABLES AND CHARTS, AND ASME TRANSACTIONS PRE-PRINT

17. CATEGORY - H
KEYWORDS - THERMODYNAMICS, WATER, PRESSURE, TEMPERATURE, LIQUIDS, VAPORS

1. NAME OR DESIGNATION OF PROGRAM - JOSHUA OPERATING SYSTEM

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - JOSHUA IS A SCIENTIFIC MODULAR DATA BASED SYSTEM FOR BATCH AND TERMINAL OPERATION. LARGE VOLUMES OF DATA CAN BE STORED AND RETRIEVED FOR COMPUTATION AND DISPLAY.

4. METHOD OF SOLUTION - THE JOSHUA OPERATING SYSTEM FACILITATES THE EXECUTION OF PROBLEMS BY THE PRESERVATION OF CONVENIENTLY REUSABLE DATA AND PROGRAMS THAT ARE STORED ON-LINE. THE DATA MAY BE USED IN BATCH OPERATION BY COMPUTATIONAL PROGRAMS AND FROM IBM2260 TERMINALS FOR CREATION AND DISPLAY.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - FEATURES INCLUDE NAMED DATA RECORDS WITH TREE-STRUCTURED CATALOGUES, DISPLAY FORMATTING, AND MODULE EXECUTION FACILITIES.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1972.
IBM360 VERSION SUBMITTED JUNE 1971, RETURNED AND REPLACED BY REVISION B SUBMITTED JULY 1974.

10. REFERENCES - THE JOSHUA SYSTEM, OPSTM-500
VOL. 1 GENERAL, NOVEMBER 1969.
VOL. 2,2.1 USER'S GUIDE, OCTOBER 1970, REVISED SEPTEMBER 1973, REVISED JANUARY 1974.
VOL. 3 DATA SET SPECS, DECEMBER 1969, REVISED MAY 1970, REVISED SEPTEMBER 1973.
VOL. 4,4.1 LATTICE PHYSICS, JUNE 1970.
VOL. 5 BASIC DATA PROCESSING, MAY 1971.
VOL. 6,6.1 STATIC REACTOR PHYSICS, MAY 1972.
VOL. 7 TRANSIENT REACTOR PHYSICS, NOVEMBER 1971.
VOL. 9,9.1,9.2,9.3 OPERATING SYSTEM, JANUARY 1971, REVISED OCTOBER 1973, REVISED DECEMBER 1973, REVISED JANUARY 1974, REVISED JUNE 1974.
TAPE DESCRIPTION AND LISTS OF PDS MEMBERS, ARGONNE CODE CENTER PROGRAMMING NOTE 75-30, 1975.

11. MACHINE REQUIREMENTS - 250K BYTES FOR 27-STATION TERMINAL MONITOR, 130K PLUS APPLICATION MODULE SIZE FOR BATCH OPERATION, IBM2260 DISPLAY STATION

12. PROGRAMMING LANGUAGES USED - FORTRAN IV (60%) AND ASSEMBLER LANGUAGE (40%)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE JOSHUA OPERATING SYSTEM IS TRANSMITTED AS SIX FILES. ONE IS DESIGNATED MODULES, SUBROUTINES, AND FUNCTIONS BY NAME, THE SECOND - ASSEMBLER SECTIONS BY NAME, THE THIRD - JOB CONTROL LANGUAGE, THE FOURTH - PROCEDURES NEEDED TO RUN THE JCL IN FILE 3, THE FIFTH - PROCEDURE-RELATED DATA, AND THE SIXTH IS THE JCL TO COPY FILES 1 THROUGH 4. THE FIRST FOUR FILES ARE 3330 PARTITIONED DATA SETS, WHILE THE FIFTH AND SIXTH FILES ARE SEQUENTIAL DATA SETS.

15. NAME AND ESTABLISHMENT OF AUTHORS -
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (PDS JOS.SOURCE 5890 BLOCKS, PDS JOS.COPYLIB 146 BLOCKS)
CONTROL INFORMATION (PDS JOS.JCLLIB 278 BLOCKS, PDS JOS.PROCLIB 51 BLOCKS, FILE 5 1 CARD, IEHMOVE DECK 30 CARDS)
REFERENCE REPORTS AVAILABLE FROM SAVANNAH RIVER LABORATORY

17. CATEGORY - M
KEYWORDS - DATA PROCESSING, OPERATING SYSTEMS, RETRIEVAL

ACC ABSTRACT 498 03/75

1. NAME OR DESIGNATION OF PROGRAM - CONCEPT3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - CONCEPT3 GENERATES A CAPITAL COST ESTIMATE FOR A SELECTION OF SINGLE UNIT AND MULTIPLE UNIT PWR, BWR, COAL, OIL AND GAS, STEAM-ELECTRIC POWER PLANTS WITH RUN-OF-RIVER, MECHANICAL DRAFT, OR NATURAL DRAFT COOLING SYSTEMS OF SPECIFIED ELECTRICAL OUTPUT FOR ANY OF TWENTY U. S. CITIES, A HYPOTHETICAL MIDDLETOWN, AND TWO CANADIAN CITIES, AND PRINTS AS A RESULT A DETAILED COST BREAKDOWN.

4. METHOD OF SOLUTION - CONCEPT3 IS SUPPORTED BY TWO AUXILIARY-GENERATED LIBRARIES - (1) CONTAC WHICH GENERATES A COST MODEL TAPE WHERE THE MODEL IS EXTRAPOLATED BY CONCEPT TO OTHER SIZES BY INTERNAL SCALING EQUATIONS, AND (2) CONLAM WHICH GENERATES A TAPE CONTAINING HISTORICAL DATA FOR LABOR AND MATERIALS THAT ARE USED FOR ADJUSTING COSTS AT A BASE LOCATION AND TIME TO A SPECIFIED LOCATION AND TIME.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - POWER LEVELS OF 500 TO 2000 MW(E) ARE ACCEPTABLE. THE AUXILIARY PROGRAM CONLAM IS LIMITED TO 30 TIME PERIODS OF COST HISTORY FOR 23 LOCATIONS WITHOUT PROGRAM ALTERATIONS.

6. TYPICAL RUNNING TIME - A SINGLE COST ESTIMATE IS GENERATED IN LESS THAN 1 MINUTE ON THE MODEL 65.

7. UNUSUAL FEATURES OF THE PROGRAM - CONCEPT3 UTILIZES EXECUTION-TIME NAMELIST VARIATIONS OF STORED CONSTANTS, PRINTER PLOTTING CASH FLOW CURVES, AND NUMEROUS OUTPUT AND SOLUTION OPTIONS.

8. RELATED AND AUXILIARY PROGRAMS - CONCEPT3 REQUIRES THE USE OF CONLAM TO GENERATE A USER FILE OF LABOR AND MATERIALS COST HISTORY AND CONTAC TO GENERATE A USER FILE OF COST MODELS TO SUPPORT CONCEPT3.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1972.
IBM360 VERSION OF CONCEPT SUBMITTED SEPTEMBER 1971, REPLACED BY CONCEPT2 MARCH 1973, REPLACED BY CONCEPT3 MARCH 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - H. I. BOWERS, R. C. DELCZIER, L. D. REYNOLDS, AND B. E. SPITE, CONCEPT - COMPUTERIZED CONCEPTUAL COST ESTIMATES FOR STEAM-ELECTRIC POWER PLANTS - PHASE II USERS MANUAL, ORNL-4809, APRIL 1973, AS AMENDED BY CONCEPT USER'S MEMORANDA 1-4, APRIL-JUNE 1973.
CONCEPT III SUPPLEMENTAL USER'S INSTRUCTIONS, ORNL NOTE, MARCH 25, 1974.
R. J. BARNARD, CONCEPT USER'S MEMO #6, MARCH 27, 1974.

10. REFERENCES (CONTINUED)

P. J. BARNARD, CONCEPT USER'S MEMO #8, APRIL 30, 1974.

CONCEPT III SYSTEM (CONSYS) DISTRIBUTION SPECIFICATIONS, ARGONNE CODE CENTER PROGRAMMING NOTE 74-41, JUNE 27, 1974.

11. MACHINE REQUIREMENTS - 150K BYTES, ONE SCRATCH DISK OR TAPE, TWO SUPPORT TAPES, AND THE STANDARD I/O UNITS

12. PROGRAMMING LANGUAGE USED - FORTRAN IV(G)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE MAIN PROGRAM USES THE IBM FORTRAN EXTENDED ERROR FEATURE (ERRSET) TO PERMIT ZERO DIVISION AND EXPONENT OVERFLOW WHICH MAY REQUIRE LOCAL ALTERATIONS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (CONCEPT3 1656 CARDS, CONLAM3 498 CARDS, CONTAC3 650 CARDS)
SAMPLE PROBLEMS (CONCEPT3 8 CARDS, CONLAM3 3359 CARDS, CONTAC3 42 FILES 737 CARDS EACH)
CONTROL INFORMATION (CONCEPT3 18 CARDS, CONLAM3 20 CARDS, CONTAC3 66 CARDS)
SAMPLE PROBLEM OUTPUT (79 SELECTED PAGES)
REFERENCE REPORT, SUPPLEMENTAL USER'S INSTRUCTIONS, USER'S MEMOS, AND ACC NOTE

17. CATEGORY - D
KEYWORDS - ECONOMICS, POWER PLANTS, PWR REACTORS, CONCEPT CODES, CONLAM CODES, CONTAC CODES

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 MVT.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THIS MODULE IS EXECUTED IN AN ARC SYSTEM ENVIRONMENT (ACC ABSTRACT 522).

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (PDS NUI002.SOURCE)
OBJECT MODULES (PDS NUIC02.SEGLIB)
LINKAGE EDITOR CONTROL STATEMENTS (PDS NUI002.OVERLAY)
LOAD MODULES (PDS NUI002.MODLIB)
CONTROL INFORMATION (JCL IEHMOVE 20 CARDS)
SAMPLE PROBLEM (263 CARDS)
SAMPLE PROBLEM OUTPUT (IEHMOVE 2 PAGES, EXECUTION 16 PAGES)
REFERENCE REPORTS AND SUPPLEMENTAL INFORMATION

17. CATEGORY - L
KEYWORDS - MODULAR SYSTEM, INPUT DATA, ARC CODES

ACC ABSTRACT 534 06/74

1. NAME OR DESIGNATION OF PROGRAM - EISPACK

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360, CDC6000-7000, UNIVAC1108, PDP10 AND H635

3. DESCRIPTION OF PROBLEM OR FUNCTION - EISPACK IS A COLLECTION OF FORTRAN SUBROUTINES TO SOLVE THE STANDARD EIGENPROBLEM FOR ANY ONE OF THE FOLLOWING CLASSES OF MATRICES - REAL GENERAL, CERTAIN REAL TRIDIAGONAL, REAL SYMMETRIC, REAL TRIDIAGONAL SYMMETRIC, COMPLEX GENERAL AND COMPLEX HERMITIAN MATRICES. THE INDIVIDUAL SUBROUTINES ARE -

IDENTIFICATION		DESCRIPTION
BALANC	E2F269	BALANCE A REAL GENERAL MATRIX
BALBAK	E2F270	BACK TRANSFORM VECTORS OF MATRIX FORMED BY BALANC
CBAL	E2F271	BALANCE A COMPLEX GENERAL MATRIX
CBABK2	E2F272	BACK TRANSFORM VECTORS OF MATRIX FORMED BY CBAL
ELMHES	E2F273	REDUCE REAL MATRIX TO REAL HESS. (ELEMENTARY)
ELMBAK	E2F274	BACK TRANSFORM VECTORS OF MATRIX FORMED BY ELMHES
ORTHES	E2F275	REDUCE REAL MATRIX TO REAL HESS. (ORTHOGONAL)
ORTBAK	E2F276	BACK TRANSFORM VECTORS OF MATRIX FORMED BY ORTHES
TRED1	E2F277	REDUCE SYM. MATRIX TO SYM. TRIDIAG.
TRED2	E2F278	REDUCE SYM. MATRIX TO SYM. TRIDIAG.
TRBAK1	E2F279	BACK TRANSFORM VECTORS OF MATRIX FORMED BY TRED1
FIGI	E2F280	REDUCE NONSYM. TRIDIAG. MATRIX TO SYM. TRIDIAG.
BAKVEC	E2F281	BACK TRANSFORM VECTORS OF MATRIX FORMED BY FIGI
COMHES	E2F282	REDUCE COMPLEX MATRIX TO COMPLEX HESS.
COMBAK	E2F283	BACK TRANSFORM VECTORS OF MATRIX FORMED BY COMHES
HTRIDI	E2F284	REDUCE HERMITIAN MATRIX TO SYM. TRIDIAG.
HTRIBK	E2F285	BACK TRANSFORM VECTORS OF MATRIX FORMED BY HTRIDI
HQR	E2F286	FIND ALL VALUES OF REAL HESS. MATRIX
HQR2	E2F287	FIND ALL VALUES/VECTORS OF REAL HESS. MATRIX
INVIT	E2F288	FIND SOME VECTORS OF REAL HESS. MATRIX
TQL1	E2F289	FIND ALL VALUES OF SYM. TRIDIAG. MATRIX
TQL2	E2F290	FIND ALL VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
IMTQL1	E2F291	FIND ALL VALUES OF SYM. TRIDIAG. MATRIX
IMTQL2	E2F292	FIND ALL VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
TSTURM	E2F293	FIND SOME VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
BISECT	E2F294	FIND SOME VALUES OF SYM. TRIDIAG. MATRIX
COMLR	E2F295	FIND ALL VALUES OF COMPLEX HESS. MATRIX
COMLR2	E2F296	FIND ALL VALUES/VECTORS OF COMPLEX HESS. MATRIX
CINVIT	E2F297	FIND SOME VECTORS OF COMPLEX HESS. MATRIX
RATQR	E2F298	FIND EXTREME VALUES OF SYM. TRIDIAG. MATRIX
ELTRAN	E2F220	ACCUMULATE TRANSFORMATIONS FROM ELMHES (FOR HQR2)
ORTRAN	E2F221	ACCUMULATE TRANSFORMATIONS FROM ORTHES (FOR HQR2)
FIGI2	E2F222	REDUCE NONSYM. TRIDIAG. MATRIX TO SYM. TRIDIAG.
TINVIT	E2F223	FIND SOME VECTORS OF SYM. TRIDIAG. MATRIX
EISPAC	E2F299	CONTROL PROGRAM FOR EISPACK

4. METHOD OF SOLUTION - QR, LR, QL, RATIONAL QR, BISECTION, AND INVERSE ITERATION METHODS ARE USED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - THESE ROUTINES HAVE BEEN CERTIFIED UNDER THE NATS PROJECT FOR THE MACHINES AND OPERATING SYSTEMS INDICATED IN ITEM 13 AND FOR THE COMPILERS INDICATED IN ITEM 12. EXTENSIVE TESTING ON THESE MACHINES HAS SHOWN NO EVIDENCE OF PERFORMANCE DIFFICULTIES. EXCEPTIONS, IF ANY, FOLLOW -

FIELD TESTING OF THE CURRENT VERSIONS OF BISECT E2F294 AND TINVIT E2F223 IS NOT YET COMPLETE.

THE NATS PROJECT FULLY SUPPORTS CERTIFIED ROUTINES IN THE SENSE THAT DETAILED INFORMATION ON THE TESTING PROCEDURES IS AVAILABLE AND REPORTS OF POOR OR INCORRECT PERFORMANCE ON AT LEAST THE MACHINES AND OPERATING SYSTEMS LISTED WILL GAIN IMMEDIATE ATTENTION FROM THE DEVELOPERS.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1972.
IBM360 VERSION SUBMITTED MAY 1972.
CDC6000-7000 VERSION SUBMITTED MAY 1972.
UNIVAC1108 VERSION SUBMITTED MAY 1972.
PDP10 AND H635 VERSION SUBMITTED MAY 1972.

10. REFERENCES - J. H. WILKINSON AND C. REINSCH, HANDBOOK FOR AUTOMATIC COMPUTATION, VOLUME II, LINEAR ALGEBRA, SPRINGER-VERLAG, NEW YORK, HEIDELBERG, BERLIN, 1971.

THE EISPACK (ACC NO. 534) REFERENCE B. T. SMITH, J. M. BOYLE, B. S. GARBOW, Y. IKEBE, V. C. KLEMA, AND C. B. MOLER, "MATRIX EIGENSYSTEM ROUTINES - EISPACK GUIDE" WAS PUBLISHED AS VOLUME 6 OF LECTURE NOTES IN COMPUTER SCIENCE EDITED BY G. GOOS AND J. HARTMANIS, SPRINGER-VERLAG (1974). IT MAY BE PURCHASED FOR APPROXIMATELY TEN (10) DOLLARS FROM SPRINGER-VERLAG, NEW YORK, NEW YORK.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN IV(G) AND (H) (IBM360/75 AND 370/165), FORTRAN IV(H) (IBM360/65,67), WATFIV (IBM360/67), FORTRAN RUN,FTN, AND FLN (CDC6000-7000), FORTRAN IV (H635), AND FORTRAN V (UNIVAC1108)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360/75,65 AND IBM370/165), MTS (IBM360/67), STAR (IBM360/67), PURD (CDC6500), LLL (CDC6600,7600), UTEX (CDC6600/6400), NCAR (CDC6600,7600), SCOPE 3.3 (CDC6400), GECOS III (H635), 503 MONITOR (PDP10), AND EXEC 8 (UNIVAC1108).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE IBM DISTRIBUTION INCLUDES ALL PROGRAMS LISTED UNDER ITEM 3. OTHER MACHINE VERSIONS DO NOT INCLUDE EISPAC E2F295.

LOCATIONS AND MACHINES USED FOR EISPACK TESTING WERE -

MACHINE	TEST SITE
IBM360/75	ARGONNE NATIONAL LABORATORY

14. ANY OTHER INFORMATION OR RESTRICTIONS (CONTINUED)

IBM360/65	THE UNIVERSITY OF CHICAGO
IBM360/67	THE UNIVERSITY OF MICHIGAN
IBM360/65	AMES LABORATORY, IOWA STATE UNIVERSITY
IBM360/67	STANFORD UNIVERSITY (STAN)
IBM370/165	THE UNIVERSITY OF TORONTO
CDC6600,7600	LAWRENCE LIVERMORE LABORATORY (LLL)
CDC6600/6400	THE UNIVERSITY OF TEXAS AT AUSTIN (UTEX)
CDC6600,7600	NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR)
CDC6400	NORTHWESTERN UNIVERSITY
CDC6500	PURDUE UNIVERSITY (PURD)
PDP-10	YALE UNIVERSITY
HONEYWELL(GE)635	UNIVERSITY OF KANSAS
UNIVAC1108	UNIVERSITY OF WISCONSIN

ADDITIONAL TESTING WAS CARRIED OUT BY OAK RIDGE NATIONAL LABORATORY AND THE NOTTINGHAM ALGORITHMS GROUP.

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (360 8100 CARDS, 6000-7000 5632 CARDS, 1108 5632 CARDS, PDP-HONEYWELL 5632 CARDS)
OBJECT DECKS (360 38 CARDS)
CONTROL INFORMATION (JCL 360-475 CARDS)
TAPE DOCUMENTATION (360 11,509 CARDS, OTHER MACHINE VERSIONS 10,349 CARDS)

17. CATEGORY - P
KEYWORDS - EIGENVALUE, EIGENVECTOR, MATRICES, NUMERICAL CALCULATION

10. REFERENCES (CONTINUED)
GROUP DIFFUSION CODE WITH AN EFFECTIVE FOUR-GROUP BURNUP, BNWL-462, MAY 1971.
R. SALMON, EXCERPTED PAGES FROM ORNL-4116, AUGUST 1969.
D. R. HAFFNER, OPERATION OF THE PACTOLUS/CLOTHO CODE, HEDL MEMO, FEBRUARY 21, 1973.
SELECTED PAGES FROM CSCX RJE/CRJE REFERENCE, EJC003-02-00, VOL. 2.
NTRAN I/O ROUTINES DESCRIPTION, EXCERPT FROM UP-3569, REV. 1.

11. MACHINE REQUIREMENTS - 65K MEMORY WITH DRUM STORAGE OF INPUT DATA TO SPEED UP PROCESSING

12. PROGRAMMING LANGUAGE USED - FORTRAN V

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - CSCX.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -
D. R. HAFFNER
HANFORD ENGINEERING DEVELOPMENT LABORATORY
WESTINGHOUSE HANFORD COMPANY
P. O. BOX 1970
RICHLAND, WASHINGTON 99352

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (PACTOLUS 4793 CARDS, PDOC 782 CARDS)
SAMPLE PROBLEMS (PACTOLUS 16 CARDS, PDOC 40 CARDS, CLOTHO 311 CARDS)
SAMPLE PROBLEM OUTPUT (PACTOLUS 20 PAGES, CLOTHO 2 PAGES)
REFERENCE REPORTS, BNWL-770 AND BNWL-1169, EXCERPTS, AND MEMO

17. CATEGORY - D
KEYWORDS - DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, REACTOR ECONOMICS, POWERCO CODES, ALTHAEA CODES

1. NAME OR DESIGNATION OF PROGRAM - WSP-HASP/DOS

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE WSP (WORK STATION PACKAGE) IS A MODIFICATION OF THE STANDARD HASP/RMT360 PACKAGE SUPPLIED BY IBM AND RUNS ON A MULTIPROGRAMMED DOS SYSTEM/360/30 USING MULTI-LEAVING AND BINARY SYNCHRONOUS COMMUNICATIONS TO COMMUNICATE WITH A SYSTEM/360/195/ASP CENTRAL CPU.

4. METHOD OF SOLUTION - WSP IS A MODIFICATION OF A COMPONENT OF THE HASP II (360D-05.1.014) VERSION 3, MODIFICATION LEVEL 1 IBM PROGRAM. WSP RUNS IN A FOREGROUND PARTITION OF A DOS MFT SYSTEM.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - WSP NORMALLY RUNS CONTINUOUSLY IN THE FOREGROUND PARTITION.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - HASP/RMT360 PACKAGE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
IBM360 DOS VERSION SUBMITTED SEPTEMBER 1973, REVISED SEPTEMBER 1974.

10. REFERENCES - ROBERT J. MCMAHON, THE ARGONNE HASP/DOS WORKSTATION PACKAGE (WSP), ARGONNE NATIONAL LABORATORY MEMORANDUM, SEPTEMBER, 1973.

11. MACHINE REQUIREMENTS - WSP HAS BEEN DESIGNED FOR A SYSTEM/360/30 WITH AN IBM 2540 READER-PUNCH, TWO IBM 1403 PRINTERS, AN IBM 1052 PRINTER KEYBOARD CONSOLE, AND AN IBM 2701 DATA ADAPTER UNIT.

12. PROGRAMMING LANGUAGE USED - DOS ASSEMBLER LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - 360 DOS RELEASE 26.1. THE ANL SYSTEM/360/195 ASP CENTRAL CPU IS OPERATING WITH VERSION 2.6.5 OF ASP REQUIRING NO CHANGES.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE PERSON RESPONSIBLE FOR WSP INSTALLATION AND OPERATION SHOULD BE WELL-VERSED IN HASP, DOS, AND ASP. DEVIATIONS FROM THE CONFIGURATION SPECIFIED IN 11, MAY REQUIRE ADDITIONAL PROGRAMMING.

15. NAME AND ESTABLISHMENT OF AUTHOR -

ROBERT J. MCMAHON
APPLIED MATHEMATICS DIVISION
ARGONNE NATIONAL LABORATORY
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ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECK (610 CARDS)
    OBJECT DECK (467 CARDS)
    CONTROL INFORMATION (DRIVER AND JCL 42 CARDS)
    REFERENCE MEMORANDUM

17. CATEGORY - P
    KEYWORDS - OPERATING SYSTEMS, DATA PROCESSING, REMOTE JOB PROCESSING, COMPUTER NETWORKS

1. NAME OR DESIGNATION OF PROGRAM - PSA2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - PSA2 COMPUTES THE REACTIONS AND STRESSES CAUSED BY THERMAL EXPANSION AND LOADS IN A MULTI-ANCHOR PIPING SYSTEM WHICH MAY CONTAIN LOOPS AND MAY BE PARTIALLY RESTRAINED AT ANY POINT IN ANY DIRECTION.

4. METHOD OF SOLUTION - THE LINEAR EQUATIONS FOR THE STATICALLY INDETERMINATE PIPE SYSTEM ARE SET UP BY A GENERALIZATION OF BROOKS MATRIX METHOD. BY A SYSTEMATIC USE OF LINEAR TRANSFORMS, THE MATRIX OF THE SYSTEM OF LINEAR EQUATIONS CAN BE OBTAINED BY INCIDENCE ALGEBRA IN THE FORM OF A SYMMETRIC BANDED MATRIX.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMUM OF - 36 SECTIONS

6. TYPICAL RUNNING TIME - 1 TO 3 MINUTES ARE REQUIRED ON A MODEL 50.

7. UNUSUAL FEATURES OF THE PROGRAM - PSA2 TAKES INTO ACCOUNT -
   (A) ELASTICITY OF THE ATTACHMENT OF THE PIPE TO THE FOUNDATION,
   (B) RESTRAINTS ON PIPE DISPLACEMENTS BY ANCHORS AND INTERMEDIATE PARTIAL CONSTRAINTS OF LINEAR TYPE,
   (C) GIVEN CONSTANT FORCES AND MOMENTS ACTING UPON THE PIPE SYSTEM,
   (D) THERMAL EXPANSION,
   (E) ANY GEOMETRICAL STRUCTURE OF THE PIPE SYSTEM,
   (F) SEVERAL CASES OF STRESSING PER PIPE SYSTEM, AND
   (G) BOTH METRIC AND ENGLISH UNITS.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
   IBM360 VERSION SUBMITTED MAY 1972, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCE - B. H. BOONSTRA, A. N. NICKOLS, W. J. HUGHES, AND W. D. GROSS, PIPE STRESS ANALYSIS CODE, PSA2, AI-64-MEMO-142, REVISION 1.

11. MACHINE REQUIREMENTS - 64K MEMORY

12. PROGRAMMING LANGUAGE USED - FORTRAN IV (H)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - FUNCTION LOC MUST BE USER-SUPPLIED. IT RETURNS THE ADDRESS OF ITS ARGUMENT AS AN INTEGER TO THE CALLING PROGRAM.

11. MACHINE REQUIREMENTS - CODE LENGTHS ARE: SOURCE, ABOUT 22,500 BYTES, OBJECT, ABOUT 13,000 BYTES, 3-BYTES PER 24-BIT WORD.

12. PROGRAMMING LANGUAGES USED - GE-400 TIME-SHARING FORTRAN

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - GSA TIME-SHARING SYSTEM.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE -
REFERENCE REPORT, ANL/ES-13, CONTAINING SOURCE LISTING, SAMPLE PROBLEM INPUT AND OUTPUT INFORMATION

17. CATEGORY - R
KEYWORDS - TIME-SHARING, POLLUTANTS CONCENTRATION, PARTICLES, ATMOSPHERE

1. NAME OR DESIGNATION OF PROGRAM - GEAR

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600,7600, IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - GEAR IS A PACKAGE OF SUBROUTINES FOR THE NUMERICAL SOLUTION OF SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS, GIVEN THE INITIAL VALUES. IT IS PARTICULARLY WELL-SUITED FOR STIFF SYSTEMS, BUT CAN BE USED GENERALLY.

4. METHOD OF SOLUTION - THE BASIC METHODS USED ARE OF THE LINEAR MULTISTEP PREDICTOR-CORRECTOR TYPE. GEAR CONTAINS BOTH THE IMPLICIT ADAMS METHODS AND THE BACKWARD DIFFERENTIATION FORMULAE, OR THE METHODS OF C. W. GEAR, AS OPTIONS, AND IS BASED ON A PROGRAM WRITTEN BY GEAR.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - CHOICE OF EITHER IMPLICIT ADAMS METHODS TO ORDER 12, OR THE BACKWARD DIFFERENTIATION FORMULA METHODS, ALSO CALLED GEAR'S STIFF METHODS, TO ORDER 5 IS ALLOWED. THE PROGRAM PRESENTLY IS DIMENSIONED TO ALLOW SOLUTION OF SYSTEMS OF UP TO 20 FIRST ORDER DIFFERENTIAL EQUATIONS.

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
CDC6600-7600 VERSION SUBMITTED JULY 1973, REPLACED BY EDITION B JANUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC JANUARY 1975 ON CDC6600 AND ON CDC7600.
IBM360 VERSION SUBMITTED SEPTEMBER 1974, REPLACED BY EDITION B JANUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC JANUARY 1975 ON IBM370/195.

10. REFERENCES - C. W. GEAR, NUMERICAL INITIAL VALUE PROBLEMS IN ORDINARY DIFFERENTIAL EQUATIONS, PRENTICE-HALL, 1971.
A. C. HINDMARSH, LINEAR MULTISTEP METHODS FOR ORDINARY DIFFERENTIAL EQUATIONS: METHOD FORMULATIONS, STABILITY, AND THE METHODS OF NORDSIECK AND GEAR, UCRL-51186, MARCH 1972.
A. C. HINDMARSH, THE CONTROL OF ERRORS IN THE GEAR PACKAGE FOR ORDINARY DIFFERENTIAL EQUATIONS, IN CONSTRUCTION OF MATHEMATICAL SOFTWARE, F. N. FRITSCH, ED., UCID-30050 PART 3, AUGUST 7, 1972.
A. C. HINDMARSH, GEAR: ORDINARY DIFFERENTIAL EQUATION SYSTEM SOLVER, UCID-30001 REV. 3, DECEMBER 1974.

11. MACHINE REQUIREMENTS - 14,000(OCTAL) WORDS TO EXECUTE THE TEST PROBLEM (CDC6600,7600), 60K BYTES (IBM360,370)

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - ORDER OR CHAT (CDC6600,7600), OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE SUBROUTINES IN THE GEAR PACKAGE ARE HEAVILY AUGMENTED WITH COMMENT CARDS. IF GEAR IS USED ON OTHER MACHINES, THE UNIT ROUNDOFF ERROR, UROUND, MAY NEED TO BE RESET. IT IS SPECIFIED IN A DATA STATEMENT IN SUBROUTINE DRIVE.

15. NAME AND ESTABLISHMENT OF AUTHOR -

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LIVERMORE, CALIFORNIA 94550

16. MATERIAL AVAILABLE -
SOURCE DECKS (6600-1133 CARDS, 360-1176 CARDS)
SAMPLE PROBLEMS (6600-74 CARDS, 360-81 CARDS)
SAMPLE PROBLEM OUTPUT (6600-9 PAGES, 360-9 PAGES)
REFERENCE REPORT, UCID-30001 REV. 3

17. CATEGORY - P
KEYWORDS - ORDINARY DIFFERENTIAL EQUATIONS, NUMERICAL CALCULATIONS, PREDICTOR-CORRECTOR

ACC ABSTRACT 593 04/75

1. NAME OR DESIGNATION OF PROGRAM - TSO-SPEAKEASY

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - SPEAKEASY IS A GENERAL-PURPOSE LANGUAGE PROCESSOR OPERATING AS A SUPER DESK CALCULATOR UNDER OS, TSO AND VM/CMS.

4. METHOD OF SOLUTION - THE LANGUAGE SYNTAX CLOSELY RESEMBLES THAT OF MATHEMATICS. USER-DEFINED VARIABLES ARE CLASSIFIED AS SCALARS, ARRAYS, VECTORS, OR MATRICES. CLASS-DIRECTED OPERATORS SIMPLIFY THE LANGUAGE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE MAJOR VERSIONS DEVELOPED WERE (1) AN IBM360/370 STANDARD JOB BATCH VERSION, (2) AN INTERACTIVE VERSION THAT RUNS UNTER TSO, AND (3) AN INTERACTIVE VERSION THAT RUNS UNDER VM370/CMS.

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - SPEAKEASY IS AN EXTENSIBLE LIBRARY-DIRECTED PROCESSOR. AVAILABLE FACILITIES INCLUDE ARRAY ALGEBRA, COMPLETE MATRIX ALGEBRA, STATISTICAL PACKAGES, GRAPHICAL PACKAGES, AND ASSORTED SPECIAL FUNCTIONS. AN ACTIVE USER COMMUNITY EXISTS.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
IBM360 IOTA VERSION 3F SUBMITTED NOVEMBER 1973, REPLACED BY REVISED EDITION MARCH 1974, DELETED JANUARY 1975.
IBM360,370 KAPPA VERSION DISTRIBUTION IS LIMITED TO SPEAKEASY USERS GROUP MEMBERSHIP.

10. REFERENCES - S. COHEN, THE SPEAKEASY-3 REFERENCE MANUAL, ANL-8000, MAY 1973.

S. COHEN, S. C. PIEPER, AND M. STOB, THE KAPPA LEVEL OF SPEAKEASY, ANL-8137, NOVEMBER 1974.

S. COHEN, SPEAKEASY: "RAKUGO", FIRST USA-JAPAN COMPUTER CONFERENCE PROCEEDINGS REPRINT, OCTOBER 3-5, 1972.

S. COHEN, TSO-SPEAKEASY NEWSLETTERS, NOS. 1-12 (AUG. 7, 1972 TO DATE).

S. COHEN, SPEAKEASY, ANL MEMO, MAY 14, 1973.

JUDITH CARLSON, REPORT ON A REVISED AND EXTENDED TUTORIAL FOR SPEAKEASY AND A LINKULE, MODE, ANL MEMO, DECEMBER 1973.

S. COHEN, SPEAKEASY, AN EVOLUTIONARY SYSTEM, PROCEEDINGS OF THE SYMPOSIUM ON VERY HIGH LEVEL LANGUAGES, MARCH 28-30, 1974.

A SPEAKEASY SAMPLER, LEVEL (IOTA), SEPTEMBER 1973.
ACC PROGRAMMING NOTE 74-32, APRIL 9, 1974.

11. MACHINE REQUIREMENTS - A 130K OR LARGER TSO REGION IS REQUIRED FOR THE TSO VERSION, 1 MEGABYTE VIRTUAL MACHINE FOR THE CMS VERSION.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV AND ASSEMBLER LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360, RELEASE 21.6, VS1, AND VS2, VM/370 CMS.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -

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9700 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - SPECIAL DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL

17. CATEGORY - P
KEYWORDS - PROGRAMMING LANGUAGES, NUMERICAL CALCULATIONS, LIBRARIES

1. NAME OR DESIGNATION OF PROGRAM - ARC-XSEC1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - ARC-XSEC1 PROVIDES THE CAPABILITY OF MANIPULATING MULTIGROUP MICROSCOPIC CROSS SECTION DATA IN THE XS.ISC FORMAT TO AFFECT MODIFICATIONS OF THE ISOTOPIC CROSS SECTION COMPONENTS, TO COLLAPSE THE ENERGY GROUP STRUCTURE TO FEWER GROUPS, AND TO HOMOGENIZE MIXTURES INTO MATERIAL AND COMPOSITION LEVEL DATA FOR USE BY THE NEUTRONICS MODULES OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM.

4. METHOD OF SOLUTION - ARC-XSEC1 CONSISTS OF FOUR RELATED MODULES - AJC007, NUI006, NUI001, AND NUC001. THE MODULE AJC007 PROVIDES A GROUP COLLAPSE OF THE MULTIGROUP XS.ISC DATA INTO A USER-SPECIFIED GROUP STRUCTURE AND WRITES THE BINARY INTERFACE DATA SET XS.ISC2. NUI006 PRODUCES RUN-TIME MODIFICATIONS OF ISOTOPIC CROSS SECTION COMPONENTS OF THE CARD IMAGE DATA SET A.NIP. THE MODULE NUI001 PROCESSES THE MATERIAL AND COMPOSITION LEVEL MIXING DATA SPECIFIED IN A.NIP AND PRODUCES MIX TABLES AS THE BINARY INTERFACE DATA SET B.HOMOG. NUC001 USES THE MIX TABLES OF B.HOMOG TO PRODUCE HOMOGENIZED MATERIAL AND COMPOSITION LEVEL CROSS SECTION DATA SETS IN THE BINARY INTERFACE DATA SET FORMATS XS.M.MIN, XS.M.ANI, XS.M.AUX, XS.C.MIN, XS.C.ANI, XS.C.AUX, RESPECTIVELY.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM PROVIDED WHICH CONSISTS OF MULTIPLE OPERATIONS, REQUIRES ABOUT 71 SECONDS ON AN IBM360/195.

7. UNUSUAL FEATURES OF THE PROGRAM - THE MODULAR DESIGN ALLOWS THE USE OF ANY OR ALL OF THE MODULES IN THIS PACKAGE WITH OTHER DESIRED MODULES. THE HOMOGENIZATION CAPABILITY, NUI001 AND NUC001, IS USED TO PROVIDE CROSS SECTION DATA FOR EACH OF THE NEUTRONICS MODULES WITH COMMUNICATION VIA INTERFACE DATA SETS.

8. RELATED AND AUXILIARY PROGRAMS - THE NEUTRONICS PATHS OF THE ARC SYSTEM UTILIZE THE CAPABILITIES PROVIDED BY THESE MODULES. THE ARC SYSTEM ENVIRONMENT IS PROVIDED BY ARC-SYSTEM (ACC ABSTRACT 522). THE BCD INPUT PROCESSOR MODULE FOR THE ARC-SYSTEM IS ARC-NUI002 (ACC ABSTRACT 533).

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
IBM360 VERSION SUBMITTED APRIL 1973, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - E. A. KOVALSKY, J. ZAPATKA, H. HENRYSON, II, J. HOOVER, AND P. M. WALKER, THE ARC SYSTEM CROSS SECTION HOMOGENIZATION AND MODIFICATION CAPABILITIES, ANL-7714, JUNE 1971.
L. C. JUST, H. HENRYSON, II, A. S. KENNEDY, S. D.

1. NAME OR DESIGNATION OF PROGRAM - TRIPLET

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC7600,6600, IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - TRIPLET SOLVES THE TWO-DIMENSIONAL MULTIGROUP TRANSPORT EQUATION IN PLANAR GEOMETRIES USING A REGULAR TRIANGULAR MESH. REGULAR AND ADJOINT, INHOMOGENEOUS AND HOMOGENEOUS (KEFF AND EIGENVALUE SEARCHES) PROBLEMS SUBJECT TO VACUUM, REFLECTIVE OR SOURCE BOUNDARY CONDITIONS ARE SOLVED. GENERAL ANISOTROPIC SCATTERING IS ALLOWED AND ANISOTROPIC DISTRIBUTED SOURCES ARE PERMITTED.

4. METHOD OF SOLUTION - THE DISCRETE ORDINATES APPROXIMATION IS USED FOR THE ANGULAR VARIABLES. A FINITE ELEMENT METHOD IN WHICH THE ANGULAR FLUX IS ASSUMED TO BE GIVEN BY A LOW-ORDER POLYNOMIAL IN EACH TRIANGLE IS USED TO SOLVE THE DISCRETE ORDINATES EQUATIONS. ANGULAR FLUXES ARE ALLOWED TO BE DISCONTINUOUS ACROSS TRIANGLE BOUNDARIES, AND THE ORDER OF THE POLYNOMIAL IS INPUT DATA TO THE CODE. BOTH INNER (WITHIN-GROUP) AND OUTER ITERATION CYCLES ARE ACCELERATED BY EITHER SYSTEM OR FINE MESH REBALANCE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - VARIABLE DIMENSIONING IS USED SO THAT ANY COMBINATION OF PROBLEM PARAMETERS LEADING TO A CONTAINER ARRAY LESS THAN MAXLEN CAN BE ACCOMMODATED. ON CDC MACHINES MAXLEN CAN BE ABOUT 40,000 WORDS AND PERIPHERAL STORAGE IS USED FOR MOST GROUP-DEPENDENT DATA. ON IBM MACHINES TRIPLET WILL EXECUTE IN SINGLE-PRECISION (4 BYTES PER WORD) SO THAT MAXLEN CAN BE SEVERAL HUNDRED THOUSAND AND MOST PROBLEMS CAN BE CORE-CONTAINED.

6. TYPICAL RUNNING TIME - A SIX-GROUP, S2, 1700 TRIANGLE, KEFF CALCULATION OF AN EBR-II CORE REQUIRES ABOUT 4.4 MINUTES OF CDC7600 TIME. RUNNING TIMES VARY ALMOST LINEARLY WITH THE TOTAL NUMBER OF UNKNOWNS.

7. UNUSUAL FEATURES OF THE PROGRAM - SOURCES, FLUXES, SN CONSTANTS, AND CROSS SECTIONS MAY BE INPUT FROM STANDARD INTERFACE FILES. CREATION OF STANDARD INTERFACE OUTPUT FILES FOR SN CONSTANTS AND SCALAR AND ANGULAR FLUXES IS OPTIONAL. ALL BINARY DATA TRANSFERS ARE LOCALIZED IN SUBROUTINES CALLED READ AND RITE. FLEXIBLE EDIT OPTIONS, INCLUDING DUMPS AND RESTART CAPABILITY, ARE PROVIDED.

8. RELATED AND AUXILIARY PROGRAMS - TRIPLET IS BASED IN LARGE PART ON THE TWO-DIMENSIONAL ORTHOGONAL MESH CODE TWOTRAN2 (ACC ABSTRACT 358), WHICH IS AN IMPROVED VERSION OF THE TWOTRAN PROGRAM.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
   CDC7600 VERSION SUBMITTED AUGUST 1973, REPLACED BY REVISED EDITION FEBRUARY 1974.
   CDC6600 VERSION SUBMITTED AUGUST 1973, REPLACED BY REVISED EDITION FEBRUARY 1974.

9. STATUS (CONTINUED)
IBM360 VERSION SUBMITTED AUGUST 1973, REPLACED BY REVISED EDITION FEBRUARY 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - WM. H. REED, T. R. HILL, F. W. BRINKLEY, AND K. D. LATHROP, TRIPLET: A TWO-DIMENSIONAL, MULTIGROUP, TRIANGULAR MESH, PLANAR GEOMETRY, EXPLICIT TRANSPORT CODE, LA-5428-MS, OCTOBER 1973.

11. MACHINE REQUIREMENTS - SIX OUTPUT (SCRATCH) UNITS AND TWO SYSTEM I/O UNITS ARE REQUIRED. USE OF FIVE INTERFACE UNITS IS OPTIONAL. ON THE CDC MACHINES A LARGE BULK MEMORY IS REQUIRED.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED -

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE CODE IS WRITTEN TO READ THE CASE INPUT DATA FROM FSET10 (7600) OR TAPE10 (6600) AND TO WRITE THE OUTPUT INFORMATION ON FSET9 (7600) OR TAPE9 (6600), WHICH ARE NOT EQUIVALENT TO THE SYSTEM INPUT AND OUTPUT UNITS.

15. NAME AND ESTABLISHMENT OF AUTHOR -
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LOS ALAMOS, NEW MEXICO 87544

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (7600-8261 CARDS, 6600-8262 CARDS, 360-8646 CARDS)
SAMPLE PROBLEMS (7600-661 CARDS, 6600-661 CARDS, 360-661 CARDS)
CONTROL INFORMATION (JCL 360-31 CARDS)
IBM 2314 LOAD MODULE (360-TRIPLET 306 BLOCKS)
SAMPLE PROBLEM OUTPUT (7600,6600-50 SELECTED PAGES, 360-45 SELECTED PAGES)
REFERENCE REPORT

17. CATEGORY - C
KEYWORDS - 2-DIMENSIONAL, MULTIGROUP, TRANSPORT THEORY, TRIANGULAR MESH, ANISOTROPIC SCATTERING, FINITE-ELEMENT, TWOTRAN2 CODES

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (IBM360,370 1831 CARDS, CDC6600,7600 1374 CARDS, UNIVAC1108 1377 CARDS)
DEMONSTRATION PROGRAM SOURCE DECKS (IBM360,370 987 CARDS, CDC6600,7600 632 CARDS, UNIVAC1108 652 CARDS)
MACHINE READABLE DOCUMENTATION (IBM360,370 ABOUT 2137 CARDS, OTHER MACHINES ABOUT 1573 CARDS)

17. CATEGORY - P
KEYWORDS - SPECIAL FUNCTIONS, EXPONENTIAL INTEGRALS, COMPLETE ELLIPTIC INTEGRALS, DAWSON'S INTEGRAL, BESSEL FUNCTIONS

ACC ABSTRACT 611 05/74

1. NAME OR DESIGNATION OF PROGRAM - CHILES

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - CHILES IS A FINITE ELEMENT COMPUTER PROGRAM THAT CALCULATES THE STRENGTH OF SINGULARITIES IN LINEAR ELASTIC BODIES. PLANE STRESS, PLANE STRAIN AND AXISYMMETRIC CONDITIONS ARE TREATED. CRACK TIP SINGULARITY PROBLEMS ARE SOLVED BY THIS VERSION OF THE CODE, BUT ANY TYPE OF INTEGRABLE SINGULARITY MAY BE PROPERLY MODELED BY MODIFYING SELECTED SUBROUTINES IN THE PROGRAM.

4. METHOD OF SOLUTION - A GENERALIZED QUADRILATERAL FINITE ELEMENT THAT INCLUDES A SINGULAR POINT AT A CORNER NODE IS INCORPORATED IN THE CODE. THE DISPLACEMENT FORMULATION IS USED AND INTER-ELEMENT COMPATIBILITY IS MAINTAINED SO THAT MONOTONE CONVERGENCE IS PRESERVED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - CHILES ALLOWS THREE SINGULAR POINTS TO BE MODELED IN THE BODY BEING ANALYZED AND EACH SINGULAR POINT MAY HAVE COUPLED MODE I AND II DEFORMATIONS. 1000 NODAL POINTS MAY BE USED.

6. TYPICAL RUNNING TIME - LESS THAN 2 MINUTES ARE REQUIRED FOR A TYPICAL PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - A PRECREATED MESH MAY BE READ FROM AN EXTERNAL FILE AND COMPUTED RESULTS ARE OUTPUT ON AN EXTERNAL FILE FOR PLOTTING.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1974.
CDC6600 VERSION SUBMITTED JANUARY 1974.

10. REFERENCES - S. E. BENZLEY AND Z. E. BEISINGER, CHILES - A FINITE ELEMENT COMPUTER PROGRAM THAT CALCULATES THE INTENSITIES OF LINEAR ELASTIC SINGULARITIES, SLA-73-0894, SEPTEMBER 1973.
S. E. BENZLEY, REPRESENTATION OF SINGULARITIES WITH ISOPARAMETRIC FINITE ELEMENTS, INTERNATIONAL JOURNAL FOR NUMERICAL METHODS IN ENGINEERING, (TO BE PUBLISHED).

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.3 USING FORTRAN EXTENDED.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
S. E. BENZLEY AND Z. E. BEISINGER
ANALYTICAL DEVELOPMENT DIVISION 1541
SANDIA LABORATORIES
ALBUQUERQUE, NEW MEXICO 87115

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (1688 CARDS)
SAMPLE PROBLEM (218 CARDS)
REFERENCE REPORT, SLA-73-0894

17. CATEGORY - I
KEYWORDS - 2-DIMENSIONAL, ELASTIC, FINITE-ELEMENT, NUMERICAL CALCULATIONS, SOLIDS, STRUCTURAL ANALYSIS, FRACTURE MECHANICS

1. NAME OR DESIGNATION OF PROGRAM - QMESH,RENUM

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - QMESH GENERATES MESHES HAVING QUADRILATERAL ELEMENTS ON ARBITRARILY SHAPED TWO-DIMENSIONAL (PLANAR OR AXI-SYMMETRIC) BODIES. THE MAIN INTENDED APPLICATION IS IN FINITE ELEMENT ANALYSIS. A FLEXIBLE HIERARCHAL INPUT SCHEME IS USED TO DESCRIBE BODIES TO QMESH AS COLLECTIONS OF REGIONS. A MESH FOR EACH REGION IS DEVELOPED INDEPENDENTLY, WITH THE FINAL ASSEMBLY AND BANDWIDTH MINIMIZATION PERFORMED BY THE SEPARATE PROGRAM, RENUM.

4. METHOD OF SOLUTION - THE MESH GENERATING PROCESS FOR EACH INDIVIDUAL REGION BEGINS WITH THE INSTALLATION OF AN INITIAL MESH WHICH IS A TRANSFORMATION OF A REGULAR GRID ON THE UNIT SQUARE. THE DIMENSIONS AND ORIENTATION OF THE INITIAL MESH MAY BE DEFINED BY THE USER OR, OPTIONALLY, MAY BE CHOSEN BY QMESH. VARIOUS SMOOTHING ALGORITHMS (SOME OF WHICH ARE NEW) MAY BE APPLIED TO THE INITIAL MESH IF DESIRED. THEN, THE MESH MAY BE "RESTRUCTURED" USING AN ITERATIVE SCHEME INVOLVING "ELEMENT PAIR RESTRUCTURING", "ACUTE ELEMENT DELETION", AND SMOOTHING. IN ELEMENT PAIR RESTRUCTURING, THE INTERFACE SIDE BETWEEN TWO ELEMENTS IS REMOVED AND REPLACED BETWEEN TWO DIFFERENT NODES BELONGING TO THE PAIR OF ELEMENTS, PROVIDED THAT THE CHANGE PRODUCES AN OVER-ALL IMPROVEMENT IN THE SHAPES OF THE TWO ELEMENTS. IN ACUTE ELEMENT DELETION, AN ELEMENT HAVING ONE DIAGONAL MUCH SHORTER THAN THE OTHER IS DELETED BY COLLAPSING THE SHORT DIAGONAL TO ZERO LENGTH. THE EXACT ORDER IN WHICH RESTRUCTURING, ELEMENT DELETION, AND SMOOTHING ARE PERFORMED MAY BE CONTROLLED BY USE OF A "SCHEME" INPUT CARD. THE SCHEME CARD ALSO ALLOWS THE USER TO CONTROL PLOTTING AND PRINTING. THE RESULTING MESH DESCRIPTIONS FOR INDIVIDUAL REGIONS ARE MELDED INTO AN INTEGRATED MESH BY THE COMPANION PROGRAM, RENUM, WHICH ALSO PERFORMS BANDWIDTH MINIMIZATION USING A MODIFIED CUTHILL-MCKEE ALGORITHM. THE RESULTING TAPE FILE IS COMPLETE WITH FLAGS FOR USE IN APPLYING BOUNDARY CONDITIONS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - QMESH CAN PROCESS UP TO 25 REGIONS, EACH HAVING AS MANY AS 600 NODES. THE MAXIMUM NUMBER OF REGIONS MAY EASILY BE INCREASED WITH LITTLE INCREASE IN PROGRAM SIZE, BUT INCREASING THE MAXIMUM NUMBER OF NODES PER REGION IS MORE COSTLY. RENUM CAN PROCESS MESHES HAVING UP TO 2000 ELEMENTS.

6. TYPICAL RUNNING TIME - MESHES OF UP TO SEVERAL HUNDRED ELEMENTS WHICH DO NOT REQUIRE RESTRUCTURING ARE HANDLED BY QMESH IN A FEW SECONDS. LARGE MESHES INVOLVING MUCH RESTRUCTURING AND SMOOTHING MAY REQUIRE SEVERAL MINUTES OF EXECUTION TIME. RENUM REQUIRES A FEW SECONDS AT MOST.

7. UNUSUAL FEATURES OF THE PROGRAM - THE HIERARCHAL INPUT SYSTEM USED IN QMESH IS QUITE NATURAL AND ALLOWS INCLUSION OF SUCH STRUCTURES AS CRACKS AND SLIDING INTERFACES. A VARIETY OF MESH-SMOOTHING TECHNIQUES, SOME NEW, ARE AVAILABLE IN QMESH. THE APPLICATION OF RESTRUCTURING TECHNIQUES TO AUTOMATICALLY IMPROVE THE SHAPES OF THE ELEMENTS IS A POWERFUL NEW CAPABILITY. AN UNUSUAL DEGREE OF USER CONTROL OVER THE PROGRAM OPERATION IS MADE POSSIBLE BY THE USE OF THE SCHEME CARD.

8. RELATED AND AUXILIARY PROGRAMS - QMESH IS A STAND-ALONE MESH GENERATION PROGRAM INTENDED FOR USE WITH A VARIETY OF TWO-DIMENSIONAL FINITE ELEMENT ANALYSIS PROGRAMS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
CDC6600 VERSION SUBMITTED AUGUST 1974.

10. REFERENCES - R. E. JONES, QMESH: A SELF-ORGANIZING MESH GENERATION PROGRAM, SLA-73-1088, JULY 1974.
R. E. JONES, USER'S MANUAL FOR QMESH, A SELF ORGANIZING MESH GENERATION PROGRAM, SLA-74-0239, JULY 1974.
R. E. JONES, COMMENTS ON CONVERTING QMESH AND RENUM TO VARIOUS COMPUTER SYSTEMS, AUGUST 1974.
ACC PROGRAMMING NOTE 75-15, DECEMBER 1974.
ACC PROGRAMMING NOTE 75-26, FEBRUARY 17, 1975.

11. MACHINE REQUIREMENTS - QMESH REQUIRES 4200 (DECIMAL) WORDS OF STORAGE, AND RENUM, 32000. THE CURRENT PROGRAM USES AN SD 4020 PLOTTER.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.3.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE SCORS PLOTTING PACKAGE IS ASSUMED TO BE AVAILABLE. ENCODE AND DECODE STATEMENTS ARE USED IN QMESH, BUT THEY CAN BE ELIMINATED IF NECESSARY. SUGGESTIONS TO AID IN CONVERSION TO OTHER SYSTEMS ARE SUPPLIED WITH THE PROGRAM. THE TEST PROBLEM WAS NOT EXECUTED BY ACC BECAUSE THE SCORS PACKAGE WAS NOT AVAILABLE.

15. NAME AND ESTABLISHMENT OF AUTHOR -
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (QMESH 5616 CARDS, RENUM 994 CARDS)
SAMPLE PROBLEM (QMESH 33 CARDS)
SAMPLE PROBLEM OUTPUT (7 PAGES AND 5 PLOTS)
REFERENCE REPORTS AND NOTES

17. CATEGORY - L
KEYWORDS - MESH GENERATION, FINITE ELEMENT METHOD, BANDWIDTH MINIMIZATION

1. NAME OR DESIGNATION OF PROGRAM - NRTS ENVIRONMENTAL SUBROUTINES

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE NRTS ENVIRONMENTAL SUBROUTINES ARE A COLLECTION OF ROUTINES DESIGNED TO AID THE PROGRAMMER BY PROVIDING EXTENSIONS TO THE FORTRAN LANGUAGE, DATA MANAGEMENT SERVICES, AND PROGRAMMING AIDS.

ASTEM EVALUATES THE 1967 ASME EQUATIONS OF STATE FOR WATER/STEAM AND DERIVATIVES OF THESE EQUATIONS.

DOUT EXTRACTS DECKS FROM A FILE AND WRITES EACH DECK AS A SEPARATE FILE SO THAT THEY CAN BE PROCESSED BY THE ASSEMBLER WHICH CAN HANDLE ONLY ONE DECK PER STEP.

UMRG IS USED TO MERGE PARTS OF UPDATE TAPES.

UPD IS USED TO UPDATE SOURCE DECKS.

STHG GENERATES WATER THERMODYNAMIC PROPERTY TABLES.

AND, IAND, DAND, OR, IOR, AND DOR GIVE THE LOGICAL PRODUCT (AND) AND LOGICAL SUM (OR) FOR 4 AND 8-BYTE WORDS.

CVI CONVERTS EBCDIC INFORMATION TO BINARY INFORMATION.

COMPAR COMPARES A CHARACTER STRING BEGINNING AT LOCATION A(I) WITH ANOTHER CHARACTER STRING BEGINNING AT LOCATION B(J). THE COMPARISON IS MADE ONE CHARACTER AT A TIME AND TERMINATED AFTER ALL REQUESTED CHARACTERS ARE TESTED OR AFTER THE FIRST INEQUALITY IS FOUND.

DATE CONVERTS THE JULIAN DATE MAINTAINED BY THE OS OPERATING SYSTEM INTO THE FORM MM/DD/YY WHERE MM IS THE MONTH, DD THE DAY, AND YY THE YEAR.

FABEND CAUSES AN ABNORMAL TERMINATION OF THE JOB STEP, AND A CORE DUMP IS PRINTED IF A SYSUDUMP OR SYSABEND DD CARD IS INCLUDED IN THE JOB STEP JCL.

THE FETCH FUNCTION RETURNS THE VALUE OF THE VARIABLE WHOSE ADDRESS IS SPECIFIED AS THE ARGUMENT.

THE EXTENDED IBCOM# ROUTINE PROVIDES AUTOMATIC PAGE CONTROL, AND OPTIONALLY, PERMITS FROM ONE TO THREE LINES TO BE INSERTED AS PAGE HEADINGS IN THE OUTPUT TO A SPECIFIED SYSOUT UNIT.

THE INP SET OF SUBROUTINES, A DATA INPUT PACKAGE FOR USE WITH FORTRAN PROGRAMS, IS A CONVERSION OF THE INPF FORTRAN PACKAGE WRITTEN BY BETTIS FOR THE CDC6600 AND CAN BE USED IN THE CONVERSION OF BETTIS PROGRAMS THAT USE INPF.

INFILQ IS AN INCORE READ AND WRITE SUBROUTINE THAT MODIFIES IBCOM# IN SUCH A WAY THAT THE NEXT READ OR WRITE REQUEST CAUSES INFORMATION IN THE USER'S LIST TO BE PLACED IN A CORE BUFFER.

JBIDZZ RETURNS THE NAME OF THE JOB ENTERED ON THE NAME FIELD OF THE JOB CARD.

JULIAN RETURNS A 5-BYTE NUMERIC JULIAN DATE IN EBCDIC CHARACTERS FROM THE OS OPERATING SYSTEM.

LOCFCN RETURNS THE ABSOLUTE CORE ADDRESS OF THE VARIABLE SPECIFIED AS THE ARGUMENT.

MAINS AND MAIND ARE MATRIX INVERSION SUBROUTINES IN SINGLE- AND DOUBLE-PRECISION, RESPECTIVELY.

MOVE TRANSFERS DATA ASSUMED TO BE IN CHARACTER, FULL-WORD, OR

3. DESCRIPTION OF PROBLEM OR FUNCTION (CONTINUED)
DOUBLE-WORD FORM FROM ONE ARRAY TO A SECOND ARRAY.
RUNOUT CAN BE USED TO OBTAIN A SECOND COPY OF THE PRINTED OUTPUT.
ISL, ISR, ISRL, SL, SR, SRL, DSL, DSR, AND DSRL ARE ARITHMETIC AND LOGICAL SHIFT FUNCTIONS FOR 4 AND 8-BYTE WORDS.
THE INTERVAL TIME ROUTINE PROVIDES THE USER WITH THE MEANS OF DETERMINING THE ELAPSED TIME OF HIS TASK.
TYME WILL RETURN THE TIME OF DAY AS THE SECOND ARGUMENT.
VOLSER PROVIDES THE VOLUME SERIAL NUMBER(S), DATA SET NAME, AND CREATION DATE OF DATA SETS RESIDING ON PERIPHERAL DEVICES (DISK OR TAPE UNITS).
ZEROUT SETS TO ZERO AN ARBITRARY LENGTH OF SEQUENTIAL 8-BYTE WORDS BEGINNING ON A DOUBLE-WORD BOUNDARY.
THE FTB PACKAGE IS A SET OF SUBROUTINES FOR CONTROLLING DYNAMIC STORAGE ALLOCATION IN FAST CORE, BULK CORE, FOUR DISK DATA SETS, AND ONE DRUM DATA SET AND PERFORMING THE I/O OPERATIONS TO DISK AND DRUM STORAGE.
SUBROUTINE FLINK ALLOWS ACCESS TO THE LINK MACRO.
THE FIOSET ROUTINE IS USED TO OVERRIDE THE FORTRAN CONVENTION FOR NAMING DD CARDS.
REMTYM GIVES THE USER ACCESS TO HIS UNUSED CPU TIME.
THE STANDARD CALCOMP PLOTTER SUBROUTINES ARE ALSO PART OF THE PACKAGE.
THE INTEGRATED GRAPHICS SYSTEM (IGS) USED AT THE RAND CORPORATION TO SUPPORT AN SC4060 STORED-PROGRAM RECORDING SYSTEM IS ALSO INCLUDED.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED NOVEMBER 1974.
IBM360 VERSION SUBMITTED AUGUST 1974, REPLACED BY REVISION B FEBRUARY 1975.

10. REFERENCES - NRTS ENVIRONMENTAL SUBROUTINE MANUAL, DECEMBER 1972.
R. J. WAGNER, L. C. RICHARDSON, AND N. F. MARSHALL, FORTRAN CALLABLE SUBROUTINES THAT FACILITATE MODULAR PROGRAMMING, ANCR NOTE, MARCH 1973.
G. J. MOORE, TIME REMAINING (REMTYM), ANCR NOTE, FEBRUARY 1973.
A. J. SMITH, STANDARD PACKAGE DESCRIPTION, CALCOMP PLOTTER SUBROUTINES (S0010.0), APPENDIX D, JANUARY 1971.
G. D. BROWN, C. H. BUSH, AND R. A. BERMAN, THE INTEGRATED GRAPHICS SYSTEM FOR THE SC-4060: I. USER'S MANUAL, MEMORANDUM RM-5660-PR, DECEMBER 1968.

10. REFERENCES (CONTINUED)

W. H. RETTIG, R. C. YOUNG, AND N. H. MARSHALL, UPD - A PROGRAM OF UPDATE SOURCE DECKS, P01751, AND ADDENDUM.

K. V. MOORE, ASTEM - A COLLECTION OF FORTRAN SUBROUTINES TO EVALUATE THE 1967 ASME EQUATIONS OF STATE FOR WATER/STEAM AND DERIVATIVES OF THESE EQUATIONS, ANCR-1026, OCTOBER 1971.

NRTS ENVIRONMENTAL SUBROUTINES, ACC PROGRAMMING NOTE 75-6, NOVEMBER 1974.

R. J. WAGNER, STH2O, A SUBROUTINE PACKAGE TO COMPUTE THE THERMODYNAMIC PROPERTIES OF WATER, ANCR NOTE, 1975.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - BECAUSE SEVERAL OF THE ROUTINES IN THE ENVIRONMENTAL PACKAGE HAVE THE SAME NAME AS SIMILAR ROUTINES IN THE AUTOMATIC CALL LIBRARY, CARE MUST BE TAKEN IN THE LINK-EDIT STEP TO ENSURE THAT THE CORRECT ROUTINE IS LOADED.

15. NAME AND ESTABLISHMENT OF AUTHOR -

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IDAHO FALLS, IDAHO 83401

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (22,099 CARDS)
REFERENCE REPORTS, NOTES, AND MEMORANDUM

17. CATEGORY - P
KEYWORDS - DATA PROCESSING, INPUT DATA, OUTPUT DATA, OPERATING SYSTEMS

ACC ABSTRACT 614 04/75

1. NAME OR DESIGNATION OF PROGRAM - HISTOGRAMS

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - HISTOGRAMS PROVIDES GRAPHICAL REPRESENTATION OF LOT SAMPLE CHARACTERISTICS IN THE FORM OF HISTOGRAM BARS. ON LARGE LOT SAMPLES, IF A HISTOGRAM BAR SHOULD EXCEED FIFTY UNITS, THE ENTIRE HISTOGRAM PLOT IS AUTOMATICALLY SCALED BY THE SMALLEST INTEGER THAT WILL CAUSE THE LARGEST FREQUENCY TO FALL WITHIN THE MAXIMUM PLOT OF FIFTY UNITS. THE NUMBER OF CELLS IN THE HISTOGRAM CAN VARY FROM 3 TO 22. THE EQUAL INTERVALS ARE DETERMINED BY THE DIFFERENCE OF THE UPPER AND LOWER BOUNDARIES DIVIDED BY THE NUMBER OF CELLS LESS TWO. IN ADDITION TO THE PLOT, THE PROGRAM PROVIDES STATISTICAL CHARACTERISTICS IN THE FORM OF: THE MEAN, STANDARD DEVIATION, SKEWNESS, KURTOSIS, RANGE, NUMBER OF STANDARD DEVIATIONS BETWEEN THE MEAN AND THE TWO SPECIFICATION LIMITS, AND UP TO NINETEEN VALUES FALLING OUTSIDE THE BOUNDARY LIMITS.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - A MAXIMUM OF 22 CELLS CAN BE PLOTTED.

6. TYPICAL RUNNING TIME - LESS THAN 1 SECOND IS REQUIRED FOR A TYPICAL PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THIS PROGRAM IS THE ALO-00187 PROGRAM TRANSFERRED FROM THE ALO-COSMIC COLLECTION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
IBM360 PROGRAM SUBMITTED SEPTEMBER 1974, SAMPLE PROBLEM EXECUTED BY ACC ON IBM370/195.

10. REFERENCES - ANALYSIS OF DATA - HISTOGRAMS, BENDIX CORPORATION COMPUTER PROGRAM REPORT QC6A, JULY 25, 1966.

11. MACHINE REQUIREMENTS - 17,928 BYTES FOR PROGRAM, 26,200 BYTES FOR LOAD MODULE

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
L. A. ELROD AND G. C. HYNES

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)

BENDIX CORPORATION
KANSAS CITY DIVISION
P. O. BOX 1159
KANSAS CITY, MISSOURI 64141

16. MATERIAL AVAILABLE -
SOURCE DECK (235 CARDS)
OBJECT DECK (78 CARDS)
SAMPLE PROBLEM (85 CARDS)
SAMPLE PROBLEM OUTPUT (8 PAGES)
REFERENCE REPORT

17. CATEGORY - P
KEYWORDS - STATISTICS, GRAPHS, SKEWNESS, KURTOSIS, STANDARD DEVIATION

1. NAME OR DESIGNATION OF PROGRAM - REXCO-H (RELEASE 2)

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - REXCO-H CALCULATES THE TWO-DIMENSIONAL HYDRODYNAMIC RESPONSE OF PRIMARY REACTOR CONTAINMENT TO A HIGH-ENERGY EXCURSION.

4. METHOD OF SOLUTION - THE EQUATIONS OF HYDRODYNAMICS AND THE EQUATIONS OF STATE OF REACTOR MATERIALS ARE EXPRESSED IN LAGRANGIAN FORM AND SET INTO FINITE DIFFERENCE EQUATIONS. SHOCK DISCONTINUITIES ARE ELIMINATED BY THE USE OF THE VON NEUMANN-RICHTMEYER PSEUDOVISCOSITY FACTOR, Q. PROPAGATION OF SHOCK WAVES, LOADS IMPOSED ON DIFFERENT PARTS OF THE REACTOR COMPONENTS, AND THE RESULTING DAMAGE ARE DETERMINED AT EVERY TIME-STEP, UNTIL THE VESSEL RUPTURES OR THE FORCE ACTING ON THE SHIELD PLUG EXCEEDS THE STRENGTH OF THE PLUG HOLDDOWN DEVICE. CALCULATED DISPLACEMENTS AND PRESSURES AT ALL SPATIAL POINTS AT ANY INSTANT OF TIME ALSO ARE GIVEN IN PICTORIAL FORM.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   3000 GRID ZONES
   1000 CYCLES IF CALCOMP DISPLAY IS REQUIRED
   20 MATERIALS
   20 SECTIONS
   10 REACTOR VESSELS
   50 POINTS FOR STRESS-STRAIN TABLE FOR REACTOR MATERIAL

6. TYPICAL RUNNING TIME - ABOUT 1 MINUTE IS REQUIRED FOR 200 CYCLES FOR THE SAMPLE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - THE REACTOR VESSELS IN THIS PROGRAM ARE TREATED AS THIN SHELL STRUCTURES.

8. RELATED AND AUXILIARY PROGRAMS - PLOT3D (ACC ABSTRACT 544) AND REXCO-H,RELEASE 1 (ACC ABSTRACT 550). RELEASE 2 IS AN IMPROVED VERSION OF REXCO-H. IT PROVIDES 3-D CALCOMP OUTPUT, ADDITIONAL EQUATIONS OF STATE FOR REACTOR MATERIALS, AND USE OF 2-D STRESSES IN TREATMENT OF REACTOR VESSELS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1973.
   IBM360 VERSION SUBMITTED OCTOBER 1973, SAMPLE PROBLEM EXECUTED BY ACC NOVEMBER 1973.

10. REFERENCES - Y. W. CHANG, J. GVILDYS, AND S. H. FISTEDIS, TWO-DIMENSIONAL HYDRODYNAMICS ANALYSIS FOR PRIMARY CONTAINMENT, ANL-7498, NOVEMBER 1969.
REXCO-H (RELEASE 2) INPUT INFORMATION REQUIRED, ANL-RAS MEMORANDUM, OCTOBER 26, 1971.
Y. W. CHANG, J. GVILDYS AND S. H. FISTEDIS, HYDRODYNAMIC RESPONSE OF PRIMARY REACTOR CONTAINMENT TO HIGH-

10. REFERENCES (CONTINUED)

ENERGY EXCURSION, NUCLEAR ENGINEERING AND DESIGN, VOL. 12, PP. 344-360, 1970.

Y. W. CHANG AND J. GVILDYS, DYNAMIC RESPONSE OF REACTOR CONTAINMENT TO HIGH-ENERGY EXCURSION, PROC. THE 1ST INTL. CONF. ON STRUCTURAL MECHANICS IN REACTOR TECHNOLOGY, BERLIN, GERMANY, 1971.

D. BASINGER AND J. GVILDYS, THREE DIMENSIONAL REPRESENTATION OF SURFACES BY COMPUTER, ANL-7633, NOVEMBER 1971.

J. VON NEUMANN AND R. D. RICHTMYER, A METHOD OF THE NUMERICAL CALCULATION OF HYDRODYNAMIC SHOCKS, JOURNAL OF APPLIED PHYSICS, VOL. 21, PP. 232-237, 1950.

J. E. ASH AND R. T. JULKE, COMPARISON OF A TWO-DIMENSIONAL HYDRODYNAMICS CODE (REXCC) TO EXCURSION REACTOR CONTAINMENT, ANL-7911, JANUARY 1972.

J. E. ASH, Y. W. CHANG, AND R. T. JULKE, COMPARISON OF A TWO-DIMENSIONAL HYDRODYNAMIC CODE (REXCC) TO EXCURSION EXPERIMENTS FOR FAST REACTOR CONTAINMENT, ANL-9711, SUPPL. 1, JULY 1972.

11. MACHINE REQUIREMENTS - 700K BYTES OF CORE, TWO 9-TRACK TAPE UNITS, ONE 7-TRACK TAPE UNIT, IBM 2280 FILM RECORDER, CALCOMP 780 PLOTTER

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - TO EXECUTE THE PICTORIAL DISPLAY, THE PROGRAM USES THE ANL ENVIRONMENTAL ROUTINES DESCRIBED IN ANL-AMD TECHNICAL MEMORANDUM NO. 167, A FILM-PLOTTING SUBROUTINE PACKAGE (FSP) FOR THE 2280 FILM RECORDER, BY D. CARSON, JUNE 17, 1968, AND TO EXECUTE THE CALCOMP PLOTS, THE PROGRAM USES THE ROUTINES DESCRIBED IN ANL-AMD TECHNICAL MEMORANDUM NO. 130, S/360 PROGRAMMING TECHNIQUES FOR THE CALCOMP 780, BY R. F. KRUPP, JANUARY 6, 1967.

15. NAME AND ESTABLISHMENT OF AUTHORS -

Y. W. CHANG, J. GVILDYS, AND S. H. FISTEDIS
REACTOR ANALYSIS AND SAFETY DIVISION
ARGONNE NATIONAL LABORATORY
9700 S. CASS AVENUE
ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION

MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (3951 CARDS)
SAMPLE PROBLEM (46 CARDS)
CONTROL INFORMATION (JCL 57 CARDS)
SAMPLE PROBLEM OUTPUT (57 SELECTED PAGES, 3 SELECTED PLOTS)
REFERENCE REPORT, ANL-7498, AND ANL-RAS MEMORANDUM

17. CATEGORY - F
KEYWORDS - 2-DIMENSIONAL, CONTAINMENT, EXCURSIONS, HYDRODYNAMICS, REACTOR SAFETY, FAST REACTORS

1. NAME OR DESIGNATION OF PROGRAM - HAFMAT

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600,7600

3. DESCRIPTION OF PROBLEM OR FUNCTION - HAFMAT WAS DEVELOPED FOR THE CALCULATION OF THE STEADY-STATE DISTRIBUTION OF FLOW TO ALL PATHS OF ANY GIVEN FLOW SYSTEM WHEN THE FLOW GEOMETRY AND HEAT ADDITION ARE SPECIFIED FOR EVERY FLOW PATH AND THE SYSTEM BOUNDARY CONDITIONS ARE DEFINED. THE SYSTEM IS CONSIDERED AS A NETWORK OF FLOW PATHS OR PIPES.

4. METHOD OF SOLUTION - TO CALCULATE THE DISTRIBUTION OF FLOW WITHIN A GIVEN SYSTEM THE INTERNAL FLOW GEOMETRY MUST BE DESCRIBED AND A REFERENCE PRESSURE AND ENTHALPY MUST BE SPECIFIED FOR AT LEAST ONE NODE IN THE NETWORK. THE FLOW GEOMETRY IS REPRESENTED BY A FINITE NUMBER OF FLOW PATHS WHICH ACCOUNT FOR ALL OF THE FLUID VOLUME. THESE FLOW PATHS, JOINED AT A NUMBER OF POINTS, FORM A SINGLE FLOW NETWORK. THE JUNCTIONS OF THE NETWORKS, OR NODES, DO NOT HAVE ANY CAPACITY FOR HEAT OR FLOW. AN INITIAL FLOW DISTRIBUTION IS SPECIFIED BY THE USER OR CALCULATED BY THE PROGRAM. FOR THE GIVEN GEOMETRY, HEAT ADDITION, AND INLET ENTHALPY, A PRESSURE DROP IS CALCULATED FOR EACH BRANCH OR FLOW PATH. BY A MATRIX TECHNIQUE, THE STATIC PRESSURE AT EACH NODE IS CALCULATED AND A SELF-CONSISTENT NEW FLOW DISTRIBUTION IS OBTAINED. THE PROGRAM THEN ITERATES THROUGH NEW FLOW DISTRIBUTIONS, NEW VALUES OF ENTHALPY, AND RECALCULATION OF PRESSURE DROPS UNTIL CONVERGENCE IS ACHIEVED OR THE ITERATION LIMIT IS REACHED. THE USER MAY SUPPLY HIS OWN PRESSURE DROP EQUATIONS IF THE PRE-PROGRAMMED ONES ARE NOT APPROPRIATE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - HAFMAT HAS THE CAPACITY TO TREAT NETWORKS COMPOSED OF UP TO 90 NODES AND 200 BRANCHES. OTHER MAXIMUM VALUES WHICH MUST NOT BE EXCEEDED ARE:
   20 EXTERNAL BRANCHES
   20 EXTERNAL NODES
   100 HEATED BRANCHES
   40 TYPES OF HEATED BRANCHES
   BASIC ASSUMPTIONS EMPLOYED ARE THAT COMPLETE AND INSTANTANEOUS MIXING OF FLUID OCCURS AT ALL NODES AND ALL FLOWS WHICH JOIN AT A NODE SEE THE SAME STATIC PRESSURE AT THAT NODE.

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM USED APPROXIMATELY 5 SECONDS OF CPU TIME.

7. UNUSUAL FEATURES OF THE PROGRAM - AN OPTIONAL SPECIAL CONVERGENCE TECHNIQUE IS SUPPLIED. IT SHOULD BE USED WITH CAUTION; BUT IT HAS BEEN FOUND USEFUL, FOR EXAMPLE, WHEN A FEW HIGH-RESISTANCE FLOW PATHS HAVE OTHERWISE RETARDED CONVERGENCE.

8. RELATED AND AUXILIARY PROGRAMS - FLOPSY-I, AN EARLIER PROGRAM, TREATED ONLY ISOTHERMAL FLOW PROBLEMS. THE ORIGINAL VERSION OF HAFMAT.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1975.
CDC6600 VERSION SUBMITTED OCTOBER 1974, SAMPLE PROBLEM EXECUTED BY ACC ON CDC6600 AND CDC7600, JANUARY 1975.

10. REFERENCES - L. H. WUNDERLICH AND D. R. DOLK, HAFMAT - STEADY-STATE FLOW DISTRIBUTION PROGRAM, KAPL-M-7128(LXW-2), JULY 6, 1970.

11. MACHINE REQUIREMENTS - 76000(OCTAL) WORDS OF CORE

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.2.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - INCREASED FLOW IN ANY BRANCH MUST LEAD TO AN INCREASED PRESSURE DROP IN THAT BRANCH. OTHERWISE, IT IS POSSIBLE THAT NO SOLUTION CAN BE OBTAINED. IN PREPARING INPUT DECKS, FOLLOW THE INPUT SHEETS ON PAGES 20-22 OF THE REFERENCE REPORT. THE INPUT DECKS WHICH ARE LISTED IN SECTION VI OF THE REPORT WERE PUNCHED FOR A SYSTEM WHICH WILL ACCEPT LEFT-JUSTIFIED INTEGER INPUT. THIS IS NOT A STANDARD CDC PRACTICE AND WILL LEAD TO INPUT ERRORS AT MANY INSTALLATIONS. ALSO, SOME VARIABLES IN HAFMAT ARE NOT INITIALIZED. IT IS ASSUMED THAT THE OPERATING SYSTEM WILL ZERO THE MEMORY AT LOAD TIME.

15. NAME AND ESTABLISHMENT OF AUTHORS -
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GENERAL ELECTRIC COMPANY
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SCHENECTADY, NEW YORK 12301

16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (2212 CARDS)
SAMPLE PROBLEM (29 CARDS)
SAMPLE PROBLEM OUTPUT (17 PAGES)
REFERENCE REPORT

17. CATEGORY - H
KEYWORDS - FLOW DISTRIBUTION, STEADY-STATE, HEAT TRANSFER, FLOPSY-1 CODES

ACC ABSTRACT 617 3/75

1. NAME OR DESIGNATION OF PROGRAM - KEFF,MGBS,TGAN

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THREE CODES FOR NUCLEAR CRITICALITY SAFETY EVALUATIONS MAKE UP THIS PACKAGE. THE PRINCIPAL CODES ARE A CODE FOR COMPUTING THE BUCKLING OF FISSILE MATERIAL MODERATED BY WATER (MGBS) AND A TWO-GROUP DIFFUSION THEORY CODE THAT USES PARAMETERS GENERATED BY THE BUCKLING CODE (TGAN). KEFF IS AN AUXILIARY CODE. KEFF COMPUTES KEFF FROM DIMENSIONS AND EXTRAPOLATION DISTANCES, OR ALTERNATIVE DIMENSIONS, VOLUMES, AND MASSES CORRESPONDING TO VALUES OF KEFF.

4. METHOD OF SOLUTION - KEFF BASES ITS CALCULATION ON

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KEFF = (1+(M**2)*BM**2)/(1+(M**2)*BG**2),
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WHERE BM**2 AND BG**2 ARE MATERIAL AND GEOMETRIC BUCKLINGS, RESPECTIVELY.

MGBS SOLVES 80 EQUATIONS IN 12 GROUPS AND ITERATES TO DETERMINE BUCKLING. FOR HETEROGENEOUS SYSTEMS MGBS PERFORMS A P3 CYLINDER CALCULATION FOR THE THERMAL GROUP AND MAKES USE OF THE HELLSTRAND OR WEITMAN RESONANCE INTEGRAL WHERE APPROPRIATE FOR THE RESONANCE GROUP. OTHERWISE, THE SYSTEM IS HOMOGENIZED. MGBS ADJUSTS TWO-GROUP CONSTANTS TO ACCOUNT FOR THE DIFFERENT LEAKAGE EXPRESSION IN DIFFUSION THEORY.

TGAN SOLVES TWO-GROUP EQUATIONS ANALYTICALLY BY VARYING A DIMENSION OR THE TRANSVERSE BUCKLING FOR CRITICALITY. TGAN PERMITS SOME REGIONS (E.G. THIN AND HIGHLY ABSORBING) TO BE CHARACTERIZED BY TRANSMISSION AND ESCAPE PROBABILITIES.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MGBS ALLOWS A MAXIMUM OF 23 REGIONS AND 9 TYPES OF MATERIAL. TGAN IS LIMITED TO 6 DIFFUSION REGIONS AND 6 TRANSMISSION REGIONS.

6. TYPICAL RUNNING TIME - EACH PROGRAM REQUIRES ONLY A FEW SECONDS.

7. UNUSUAL FEATURES OF THE PROGRAM - SPEED, CONVENIENCE, AND MANY CORRELATIONS (IN CONJUNCTION WITH TWO-GROUP DIFFUSION THEORY) WITH CRITICAL EXPERIMENTS MAKE MGBS PARTICULARLY SUITABLE FOR CRITICALITY SAFETY PROBLEMS.

IN A CRITICALITY SEARCH TGAN RECOGNIZES TERMS IN MATRIX PRODUCTS THAT ARE IDENTICALLY ZERO. LESS CARE IS TAKEN WITH SEPARATE CALCULATION OF FLUXES, WHICH MAY BE GROSSLY IN ERROR. SPEED, CONVENIENCE, AND MANY CORRELATIONS (IN CONJUNCTION WITH MGBS) WITH CRITICAL EXPERIMENTS MAKE TGAN PARTICULARLY SUITABLE FOR CRITICALITY SAFETY PROBLEMS.

8. RELATED AND AUXILIARY PROGRAMS - TGAN PUNCHES KEFF INPUT FOR DIMENSION SEARCH FOR SLABS, CYLINDERS, AND SPHERES. MGBS PUNCHES TWO-GROUP CROSS SECTIONS FOR TGAN.

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
IBM360 VERSION SUBMITTED SEPTEMBER 1973, SAMPLE PROBLEMS EXECUTED BY ACC.

10. REFERENCES - H. K. CLARK, COMPUTER CODES FOR NUCLEAR CRITICALITY SAFETY CALCULATIONS, DP-1121, NOVEMBER 1967.
H. K. CLARK, CORRELATIONS OF COMPUTATIONAL TECHNIQUES AND EXPERIMENTS, DPST-71-300, MARCH 30, 1971.

11. MACHINE REQUIREMENTS - 100K BYTES OF CORE ARE REQUIRED FOR KEFF, 150K BYTES OF CORE FOR MGBS, AND 135K BYTES OF CORE FOR TGAN.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -
H. K. CLARK
SAVANNAH RIVER LABORATORY
E. I. DUPONT DE NEMOURS AND COMPANY, INC.
AIKEN, SOUTH CAROLINA 29801

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (KEFF 259 CARDS, MGBS 2545 CARDS, TGAN 2468 CARDS)
SAMPLE PROBLEMS (KEFF 2 CARDS, MGBS 26 CARDS, TGAN 102 CARDS)
SAMPLE PROBLEM OUTPUT (KEFF 1 PAGE, MGBS 3 PAGES, TGAN 7 PAGES)
REFERENCE REPORTS, DP-1121 AND DPST-71-300

17. CATEGORY - C
KEYWORDS - CRITICALITY, BO EQUATIONS, GROUP CONSTANTS, CELL CALCULATION, 1-DIMENSIONAL, 2-GROUP

ACC ABSTRACT 618 08/74

1. NAME OR DESIGNATION OF PROGRAM - GAPCON-THERMAL1

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - UNIVAC1108

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE GAPCON-THERMAL1 PROGRAM PROVIDES A METHOD FOR CALCULATING THE GAP CONDUCTANCE IN OXIDE FUEL PINS. FUEL AND CLADDING TEMPERATURES, AND INTERNAL PRESSURES ARE CALCULATED AS A FUNCTION OF BURNUP FROM INPUT COOLANT CONDITIONS, POWER SHAPES, AND ROD GEOMETRIES.

4. METHOD OF SOLUTION - THE MATHEMATICAL MODEL OF THE FUEL ROD IS BASED ON A SERIES OF CONCENTRIC CYLINDERS AND ONE-DIMENSIONAL HEAT TRANSFER. THE CALCULATION OF FUEL TEMPERATURES FOR A SPECIFIED BURNUP IS INITIATED BY USING AN ESTIMATED GAP CONDUCTANCE. THE SOLUTION CONVERGES BY THE COMPARISON OF A CALCULATED GAP CONDUCTANCE WITH THE PREVIOUS ESTIMATE. THE CALCULATED GAP CONDUCTANCE DEPENDS ON THE HOT GAP SIZE AND THE COMPOSITION OF THE GAS IN THE GAP. FACTORS CONSIDERED IN THE CALCULATION INCLUDE POROSITY-DEPENDENT THERMAL CONDUCTIVITY, FLUX DEPRESSION, DIFFERENTIAL THERMAL EXPANSION OF THE PELLET AND CLADDING, ELASTIC AND CREEP DEFORMATION OF THE CLADDING, FISSION PRODUCT EXPANSION OF THE PELLET, FILL GAS COMPOSITION, AND CHANGES TO THE GAS COMPOSITION ASSOCIATED WITH THE RELEASE OF FISSION GAS AND VOLATILE IMPURITIES.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE CODE IS UNDER DEVELOPMENT AND SHOULD BE LIMITED TO ZIRCONIUM CLAD OXIDE FUEL. BEGINNING OF LIFE CALCULATIONS SHOW GOOD AGREEMENT WITH DATA. HOWEVER, EXPOSURE-DEPENDENT CALCULATIONS CAN BE UNRELIABLE UNDER CERTAIN CONDITIONS OF POWER, ROD GEOMETRY, AND BURNUP. WORK IS CONTINUING TO IMPROVE LIMITATIONS IN THE CODE ASSOCIATED WITH FUEL BURNUP. UP TO 20 AXIAL NODES MAY BE SPECIFIED TO MODEL AXIAL POWER SHAPE EFFECTS.

6. TYPICAL RUNNING TIME - A TYPICAL CASE WITH POWER AND TIME INCREMENTS MAY REQUIRE ABOUT 45 SECONDS. HOWEVER, SOME USER OPTIONS MAY INCREASE RUNNING TIME.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - GAPCON

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1974.
UNIVAC1108 VERSION SUBMITTED OCTOBER 1973.

10. REFERENCES - C. R. HANN, C. E. BEYER, AND L. J. PARCHEN, GAPCON-THERMAL-1, A COMPUTER PROGRAM FOR CALCULATING THE GAP CONDUCTANCE IN OXIDE FUEL PINS, BNWL-1778, SEPTEMBER 1973.
G. R. HORN AND F. E. PANISKO, USERS GUIDE FOR GAPCON A COMPUTER PROGRAM TO PREDICT FUEL-TO-CLADDING HEAT TRANSFER COEFFICIENTS IN OXIDE FUEL PINS, HEDL-TME-72-128, SEPTEMBER 1972.

11. MACHINE REQUIREMENTS - 35K ADDRESSABLE CORE STORAGE

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - CSCX.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THERE ARE 13 ROUTINES AND THE EXECUTABLE MAIN PROGRAM GAPAXL.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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RICHLAND, WASHINGTON 99352

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECK (1706 CARDS)
    SAMPLE PROBLEM (21 CARDS)
    REFERENCE REPORT, BNWL-1778

17. CATEGORY - H
    KEYWORDS - GAP CONDUCTANCE, TEMPERATURE, FISSION GAS, THERMAL EXPANSION, FUEL ELEMENTS, CLADDING

ACC ABSTRACT 619 03/75

1. NAME OR DESIGNATION OF PROGRAM - ISOTAB

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/50

3. DESCRIPTION OF PROBLEM OR FUNCTION - ISOTAB COMPUTES POWER OUTPUT OF A SAMPLE OF MIXED ISOTOPES (PU238, PU239, PU240, PU241, PU242, AM241) AT ANY DESIRED DATE GIVEN THE MEASURED CALORIMETER VALUES, ISOTOPIC RATIOS AND CORRESPONDING DATES.

4. METHOD OF SOLUTION - STANDARD STATISTICAL ANALYSIS IS USED. THE PROGRAM TAKES AS INPUT THE ISOTOPIC RATIOS, SPECIFIC POWERS, THE TIME FROM AMERICIUM SEPARATION TO MASS SPECTRAL DETERMINATION (WHICH CAN BE DETERMINED FROM THE RATIO OF PU241 TO AM241 FOUND BY CHEMICAL ANALYSIS) AND THE TIME FROM MASS SPECTROMETRIC ANALYSIS TO CALORIMETRIC DETERMINATIONS. THE TOTAL QUANTITY OF PLUTONIUM IN GRAMS AT THE DATE OF THE CALORIMETRIC ANALYSIS, AND THE TOTAL SAMPLE POWER BY DAY FOR ANY PERIOD OF TIME DESIRED ARE CALCULATED AND PRINTED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - 5 TO 6 MINUTES ARE REQUIRED FOR A SAMPLE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1974.
IBM360 VERSION SUBMITTED SEPTEMBER 1973, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - M. BASTON, ISOTAB, PLU167RQ PROGRAM DOCUMENTATION, OCTOBER 17, 1972.
F. A. O'HARA, J. D. NUTTER, W. W. RODENBURG AND M. L. DINSMORE, CALORIMETRY FOR SAFEGUARDS PURPOSES DETERMINATION OF PLUTONIUM IN REACTOR FEED MATERIAL, MLM-1798, JANUARY 5, 1972.

11. MACHINE REQUIREMENTS - 41K CORE, A CARD READER AND A PRINTER

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (MVT), RELEASE 21.6.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
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15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)
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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
SOURCE DECK (711 CARDS)
OBJECT DECK (368 CARDS)
SAMPLE PROBLEM (11 CARDS)
CONTROL INFORMATION (JCL 34 CARDS)
REFERENCE REPORT AND PROGRAM DOCUMENTATION

17. CATEGORY - C
KEYWORDS - CALORIMETRY, REACTOR FUEL ELEMENTS, PLUTONIUM, AMERICIUM

1. NAME OR DESIGNATION OF PROGRAM - GROUP2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195, CDC6600,7600

3. DESCRIPTION OF PROBLEM OR FUNCTION - THIS PROGRAM CALCULATES THE SYMMETRY PROPERTIES OF LATTICE VIBRATIONS EITHER FOR ATOMIC CRYSTALS OR FOR EXTERNAL MODES OF MOLECULAR CRYSTALS AND GENERATES THE IRREDUCIBLE MULTIPLIER REPRESENTATIONS (IMR'S) INCLUDING THE EFFECTS OF TIME REVERSAL INVARIANCE (TRI) ON THE SYMMETRY COORDINATES.

4. METHOD OF SOLUTION - THE INVARIANCE OF THE DYNAMICAL MATRIX UNDER UNITARY TRANSFORMATIONS BY MATRICES IN A REDUCIBLE MULTIPLIER REPRESENTATION OF THE TIME REVERSAL INVARIANT POINT GROUP OF THE WAVEVECTOR LEADS TO A FORMULA FOR THE SYMMETRY-REDUCTION OF THE DYNAMICAL MATRIX. THE PROJECTION OPERATOR METHOD IS USED TO CONSTRUCT THE SYMMETRY COORDINATES. THE PROJECTION OPERATOR IS DEPENDENT ON THE REDUCIBLE MULTIPLIER REPRESENTATION USED AND THE IMR'S OF THE GROUP OF THE WAVEVECTOR. THESE IMR'S ARE GENERATED IN THE PROGRAM BY THE METHOD OF ORBITALS FROM THE REPRESENTATIONS OF CYCLIC SUBGROUPS OF THE GROUP OF THE WAVEVECTOR WHICH IN TURN ARE CONSTRUCTED FROM THE ROOTS OF UNITY. THE SYMMETRY COORDINATE VECTORS FORM A MATRIX, WHICH TRANSFORMS THE SYMMETRY-REDUCED DYNAMICAL MATRIX INTO BLOCK-DIAGONALIZED FORM.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE PROGRAM IS DIMENSIONED FOR UP TO 30 DEGREES OF FREEDOM PER UNIT CELL. THIS MAY BE 10 ATOMS OR 5 MOLECULAR UNITS PER UNIT CELL OR SOME COMBINATION OF ATOMS AND MOLECULAR UNITS. EACH ATOM HAS 3 DEGREES OF FREEDOM, AND EACH MOLECULAR UNIT HAS 6. BY CHANGING A DIMENSION STATEMENT, UP TO 60 DEGREES OF FREEDOM PER UNIT CELL MAY BE CONSIDERED. BECAUSE OF THE USE OF RANDOM NUMBERS INSTEAD OF ALGEBRAIC TECHNIQUES, THE SYMMETRY REDUCTION WILL BE INCOMPLETE FOR CRYSTALS OF THE D3 OR C3 POINT GROUPS. THIS SAME PROBLEM SOMETIMES OCCURS FOR OTHER CRYSTALS WITH A LARGE NUMBER OF ATOMS PER UNIT CELL.

6. TYPICAL RUNNING TIME - 10 SECONDS ARE REQUIRED FOR ALL WAVE VECTORS OF A CRYSTAL WITH TWO ATOMS PER UNIT CELL.

7. UNUSUAL FEATURES OF THE PROGRAM - THE PROGRAM REQUIRES ONLY THE THREE LATTICE VECTORS, THE ATOMIC POSITIONS, AND THE DESIRED WAVE VECTORS AS INPUT. IT DETERMINES ALL OF THE SYMMETRY PROPERTIES IN ONE PASS. IT WILL ALSO CALCULATE EXTERNAL MODES OF MOLECULAR CRYSTALS. TIME REVERSAL IS CONSIDERED IN ALL CALCULATIONS.

8. RELATED AND AUXILIARY PROGRAMS - ACMI/EM/IMR WAS AN EARLIER VERSION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED NOVEMBER 1974.
IBM360 VERSION SUBMITTED OCTOBER 1974, SAMPLE PROBLEM

9. STATUS (CONTINUED)
EXECUTED BY ACC OCTOBER 1974 ON IBM370/195.
CDC6600 VERSION SUBMITTED OCTOBER 1974, SAMPLE PROBLEM EXECUTED BY ACC OCTOBER 1974 ON CDC7600.

10. REFERENCES - T. G. WORLTON AND J. L. WARREN, GROUP THEORETICAL ANALYSIS OF LATTICE VIBRATIONS, COMPUTER PHYSICS COMMUNICATIONS, VOL. 3, PP. 88-117, 1972.
T. G. WORLTON AND J. L. WARREN, ERRATUM, IBID., VOL. 4, PP. 382-383, 1972.
T. G. WORLTON, EXTERNAL MODES OF MOLECULAR CRYSTALS, IBID., VOL. 4, PP. 249-256, 1972.
T. G. WORLTON, IRREPRODUCIBLE MULTIPLIER REPRESENTATIONS, IBID., VOL. 6, PP. 149-155, 1973.
J. L. WARREN AND T. G. WORLTON, IMPROVED VERSION OF GROUP-THEORETICAL ANALYSIS OF LATTICE DYNAMICS, IBID., IN PRESS (OCTOBER 1974).
J. L. WARREN AND T. G. WORLTON, SYMMETRY PROPERTIES OF THE LATTICE DYNAMICS OF TWENTY-THREE CRYSTALS, ANL-8053 AND LA-5465-MS, DECEMBER 1973.

11. MACHINE REQUIREMENTS - THE IBM360 REQUIRES 240K BYTES TO COMPILE AND 230K BYTES TO EXECUTE. THE CDC6600 VERSION REQUIRES 55000 (OCTAL) WORDS TO COMPILE, 125000 (OCTAL) WORDS TO EXECUTE.

12. PROGRAMMING LANGUAGE(S) USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360) AND SCOPE 3.1 (CDC6600).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE INPUT DECK STRUCTURE IS INDICATED ON COMMENT CARDS IN THE MAIN PROGRAM. THE SYSTEM LIBRARY OR USER MUST SUPPLY THE FUNCTION RANF(N) WHICH PRODUCES A UNIFORMLY-DISTRIBUTED SEQUENCE OF REAL RANDOM NUMBERS. IN THE IBM VERSION, N=-1; IN THE CDC, N=0. IN SOME CASES, THE PHASE ANGLE MATRIX AND THE BLOCK-DIAGONALIZED DYNAMICAL MATRIX ARE NOT FIXED BY SYMMETRY CONSIDERATIONS AND MAY DIFFER FROM THE SAMPLE OUTPUT. ALSO, OTHER VECTORS MAY HAVE DIFFERENT REPRESENTATIONS, DEPENDING ON THE SPECIFIC IMPLEMENTATION OF THE ATAN FUNCTION.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECKS (360-2288 CARDS, 6600-2290 CARDS)
    SAMPLE PROBLEMS (360-35 CARDS, 6600-35 CARDS)
    SAMPLE PROBLEM OUTPUT (360-7 PAGES, 6600-7 PAGES)
    REFERENCE PREPRINT: IMPROVED VERSION OF GROUP-THEORETICAL ANALYSIS OF LATTICE DYNAMICS

17. CATEGORY - Q
    KEYWORDS - SOLID STATE, LATTICE DYNAMICS, GROUP THEORY, PHONONS

1. NAME OR DESIGNATION OF PROGRAM - BH99

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - BH99 IS USED FOR THE STATISTICAL ANALYSIS OF DATA BASED ON THE EXTREME VALUE DISTRIBUTION.

4. METHOD OF SOLUTION - THE DISTRIBUTION FUNCTION

$$F(X) = EXP(-E**(-(X-MU)/BETA)),$$

CALLED THE EXTREME VALUE DISTRIBUTION IS USED TO DESCRIBE A POPULATION EACH OF WHOSE ELEMENTS MAY BE LOOKED UPON AS THE MAXIMUM OF A SET OF POSSIBLE VALUES. THE DENSITY FUNCTION IS POSITIVELY SKEWED. MU IS A LOCATION PARAMETER, THE MODE, WHILE BETA IS A SCALE PARAMETER. THE ESTIMATION PROBLEM IS SOLVED USING TWO METHODS. ONE IS WHERE MAXIMUM LIKELIHOOD ESTIMATES OF MU AND BETA ARE COMPUTED USING AN ITERATIVE SCHEME TO SOLVE THE NONLINEAR NORMAL EQUATIONS. THE OTHER IS BY A METHOD DEVELOPED BY LIEBLEIN (REFERENCE 3) USING THE ORDER STATISTICS. THE RESULTS OF THE FIT USING THE METHOD OF MAXIMUM LIKELIHOOD ARE PRINTED AND, FOR SAMPLES OF SIZES N LESS THAN 36, THE RESULTS USING ORDER STATISTICS ARE ALSO GIVEN. THIS IS FOLLOWED BY A FREQUENCY DISTRIBUTION OF THE OBSERVATIONS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - WHEN FITTING THE DISTRIBUTION USING ORDER STATISTICS, SAMPLES OF SIZES UP TO N=35 MAY BE COMPUTED.

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - FOR EITHER METHOD USED, THE ESTIMATES OF MU AND BETA ARE PRINTED FOLLOWED BY ESTIMATES OF SEVERAL PERCENTILES OF THE DISTRIBUTION TOGETHER WITH THEIR APPROXIMATE 68 PERCENT CONFIDENCE INTERVALS.

8. RELATED AND AUXILIARY PROGRAMS - BH99 USES THE BETTIS ENVIRONMENTAL ROUTINES (ACC ABSTRACT 478).

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1974.
CDC6600 VERSION SUBMITTED JANUARY 1974.

10. REFERENCES - T. SHIMAMOTO, BH99 - A PROGRAM FOR THE STATISTICAL ANALYSIS OF DATA BASED ON THE EXTREME VALUE DISTRIBUTION, WAPD-TM-1137, AUGUST 1973.
C. J. PFEIFER, CDC-6600 FORTRAN PROGRAMMING - BETTIS ENVIRONMENTAL REPORT, WAPD-TM-668, JANUARY 1967.
J. LIEBLEIN, A NEW METHOD OF ANALYZING EXTREME-VALUE DATA, NASA TECHNICAL NOTE 3053, JANUARY 1954.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -

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BETTIS ATOMIC POWER LABORATORY
WESTINGHOUSE ELECTRIC CORPORATION
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16. MATERIAL AVAILABLE - RESTRICTED DISTRIBUTION
SOURCE DECK (890 CARDS)
SAMPLE PROBLEM (6 CARDS)
REFERENCE REPORT, WAPD-TM-1137

17. CATEGORY - P
KEYWORDS - ORDER STATISTICS, EXTREME VALUE DISTRIBUTION, MAXIMUM LIKELIHOOD ESTIMATES

1. NAME OR DESIGNATION OF PROGRAM - GAUSS6

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/75

3. DESCRIPTION OF PROBLEM OR FUNCTION - GAUSS6 IS USED FOR THE PRODUCTION ANALYSIS OF GAMMA-RAY SPECTRA OBTAINED WITH A GE(LI) DETECTOR AND A MULTICHANNEL PULSE-HEIGHT ANALYZER SYSTEM. IN ADDITION TO DETERMINING GAMMA-RAY ENERGIES AND INTENSITIES, IT PROVIDES ISOTOPIC IDENTIFICATION, DECAY CORRECTIONS AND CORRELATION OF DATA FROM DIFFERENT PEAKS AND DIFFERENT SPECTRA TO OBTAIN ISOTOPIC DECAY RATES.

4. METHOD OF SOLUTION - GAUSS6 CARRIES OUT THE FOLLOWING STEPS -
   (A) SORTS MASTER NUCLIDE LIBRARY TO OBTAIN A SUBSET INCLUDING ONLY THE NUCLIDES OF INTEREST.
   (B) AUTOMATICALLY LOCATES PEAKS BY MEANS OF AN AUTO-CORRELATION ROUTINE.
   (C) FITS EACH PEAK WITH A GAUSSIAN FUNCTION PLUS A LINEAR FUNCTION REPRESENTING THE SPECTRAL BACKGROUND. ONLY THE THREE GAUSSIAN PARAMETERS (HEIGHT, WIDTH, AND POSITION) ARE ALLOWED TO VARY. THE FIT EXTENDS DOWN TO 1.5 TIMES THE WIDTH OF THE GAUSSIAN (FWHM). FITS THAT FAIL TO CONVERGE ARE REPEATED WITH A FIXED WIDTH.
   (D) DETERMINES PEAK WIDTH AND ENERGY CALIBRATION FUNCTIONS FROM A TH228 SPECTRUM. THESE FUNCTIONS AS WELL AS THE ENERGY CALIBRATION FROM ANY SPECTRUM CAN BE TRANSFERRED TO SUBSEQUENT SPECTRA.
   (E) ATTEMPTS ISOTOPIC ASSIGNMENTS FOR ALL PEAKS. DECAY CORRECTIONS ARE MADE.
   (F) FOR SPECTRA FROM THE SAME SAMPLE, EDITS AND AVERAGES THE RESULTS TO OBTAIN THE ISOTOPIC DECAY RATES.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - GALSS6 WILL HANDLE ANY NUMBER OF SPECTRA OF UP TO 4096 CHANNELS WITH UP TO 300 PEAKS AND 20 ENERGY CALIBRATION LINES. THE SUBSET OF THE ISOTOPIC LIBRARY IS LIMITED TO 1000 GAMMA RAYS.

6. TYPICAL RUNNING TIME - TYPICAL SPECTRA CAN BE ANALYZED AT A RATE OF ABOUT 5 PER MINUTE.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THE PROGRAM PACKAGE INCLUDES THE FOLLOWING AUXILIARY PROGRAMS -
   (A) LCTAPE FOR PUTTING NONLINEARITY CORRECTION AND EFFICIENCY TABLES ON DISK.
   (B) UPDATE FOR UPDATING THE MASTER NUCLIDE LIBRARY.
   (C) RASLIB FOR PRODUCING A SUBSET OF THE MASTER NUCLIDE LIBRARY (NORMALLY RUN AS PART OF THE ANALYSIS RUN).
   (D) MERGE FOR COMBINING THE OUTPUT TAPES FROM SEVERAL GAUSS6 ANALYSES.

8. RELATED AND AUXILIARY PROGRAMS (CONTINUED)
   (E) CORLAT FOR CARRYING OUT THE COMPARISON AND AVERAGING OF THE SEVERAL MEASUREMENTS FOR EACH SAMPLE.
   (F) LIBRER FOR GENERATING A NUCLIDE LIBRARY DATA SET FROM CARDS.
   (G) SECLIB FOR GENERATING A SECONDARY LIBRARY SUBSET FOR CORLAT.

   GAUSS6 IS BASED ON GAUSS5 (ACC ABSTRACT 605), BUT IS WRITTEN TO ANALYZE LARGE GROUPS OF SPECTRA EFFICIENTLY AND INCLUDES CALCULATIONS BEYOND THE GAMMA-RAY ENERGIES AND INTENSITIES AND CAN COMPARE RESULTS FROM DIFFERENT GAMMA-RAYS AND DIFFERENT SPECTRA TO VERIFY NUCLIDE ASSIGNMENTS FOR INDIVIDUAL PEAKS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1974.
   IBM360 VERSION SUBMITTED OCTOBER 1973, SAMPLE PROBLEM EXECUTED BY ACC FEBRUARY 1974.

10. REFERENCES - J. E. CLINE, M. H. PUTNAM, AND R. G. HELMER, GAUSS VI, A COMPUTER PROGRAM FOR THE AUTOMATIC BATCH ANALYSIS OF GAMMA-RAY SPECTRA FROM GE(LI) SPECTROMETERS, ANCR-1113, JUNE 1973.
   GAUSS6, ACC NO. 622, ARGONNE CODE CENTER PROGRAMMING NOTE 74-29, MARCH 29, 1974.

11. MACHINE REQUIREMENTS - GAUSS6 REQUIRES STORAGE DEVICES FOR THE SPECTRAL LIBRARY, NUCLIDE LIBRARY SUBSET, AND THE CORRELATION DATA IN ADDITION TO THREE SCRATCH DEVICES AND THE CARD READER AND PRINTER. CORLAT REQUIRES STORAGE DEVICES FOR THE SECONDARY LIBRARY SUBSET AND THE CORRELATION DATA PLUS FOUR SCRATCH DEVICES AND THE CARD READER AND PRINTER.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV, BAL, PL/1

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 MVT.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE CORLAT PROGRAM REQUIRES THE IBM360 SORT PACKAGE.

15. NAME AND ESTABLISHMENT OF AUTHORS -
   R. G. HELMER, J. E. CLINE, AND M. H. PUTNAM
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   550 SECOND STREET
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
   SOURCE DECKS (GAUSS6 6636 CARDS, RASLIB 461 CARDS, LCTAPE 164 CARDS, LIBRER 182 CARDS, CORLAT 1824 CARDS, MERGE 248 CARDS, UPDATE 518 CARDS)
   LOAD MODULES (GAUSS6 149 BLOCKS, SECLIB 59 BLOCKS, CORLAT 96 BLOCKS)
   OBJECT DECK (MERGE 14 CARDS)
   SAMPLE PROBLEMS (GAUSS6 2533 CARDS, RASLIB 5 CARDS, LCTAPE 59 CARDS, LIBRER 10 CARDS, MERGE 1 CARD)

16. MATERIAL AVAILABLE (CONTINUED)
CONTROL INFORMATION-JCL (GAUSS6 28 CARDS, RASLIB 11 CARDS, LCTAPE 8 CARDS, LIBRER 10 CARDS, CORLAT 130 CARDS, MERGE 14 CARDS, UPDATE 9 CARDS)
REFERENCE REPORT AND ACC NOTE

17. CATEGORY - W
KEYWORDS - GAMMA-RAY SPECTRA, GE(LI) DETECTORS, ISOTOPES IDENTIFICATION, LIBRER CODES, CORLAT CODES, RASLIB CODES, MERGE CODES, UPDATE CODES, SECLIB CODES

ACC ABSTRACT 623 02/75

1. NAME OR DESIGNATION OF PROGRAM - SETS

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - SETS IS USED TO ACHIEVE THE SYMBOLIC MANIPULATION OF SET (OR BOOLEAN) EQUATIONS, PARTICULARLY THE REDUCTION OF SET EQUATIONS BY THE APPLICATION OF SET IDENTITIES.

4. METHOD OF SOLUTION - THE SETS PROGRAM IS USED TO READ, INTERPRET, AND EXECUTE THE STATEMENTS OF A SETS USER PROGRAM WHICH IS AN ALGORITHM THAT SPECIFIES THE PARTICULAR MANIPULATIONS TO BE PERFORMED AND THE ORDER IN WHICH THEY ARE TO OCCUR.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - ANY PROPERLY FORMED SET EQUATION INVOLVING THE SET OPERATIONS OF UNION, INTERSECTION, AND COMPLEMENT IS ACCEPTABLE FOR PROCESSING BY THE SETS PROGRAM. RESTRICTIONS ON THE SIZE OF A SET EQUATION THAT CAN BE PROCESSED ARE NOT ABSOLUTE BUT RATHER ARE RELATED TO THE NUMBER OF TERMS IN THE DISJUNCTIVE NORMAL FORM OF THE EQUATION, THE NUMBER OF LITERALS IN THE EQUATION, ETC. NEVERTHELESS, SET EQUATIONS INVOLVING THOUSANDS AND EVEN HUNDREDS OF THOUSANDS OF TERMS CAN BE PROCESSED SUCCESSFULLY.

6. TYPICAL RUNNING TIME - RUNNING TIME VARIES WITH RESPECT TO THE PARTICULAR SET EQUATIONS BEING PROCESSED AND THE SYMBOLIC MANIPULATIONS BEING PERFORMED. ALTHOUGH NO GENERAL RULE FOR PREDICTING RUN TIME IS KNOWN, THE REDUCTION (EXPANSION, SIMPLIFICATION, AND FACTORIZATION) OF A SET EQUATION USUALLY REQUIRES MORE RUN TIME THAN OTHER MANIPULATIONS, AND THIS TIME TENDS TO INCREASE AS THE NUMBER OF TERMS IN THE DISJUNCTIVE NORMAL FORM OF THE SET EQUATION INCREASES. THE SAMPLE PROBLEM REQUIRES LESS THAN 7 SECONDS OF CENTRAL PROCESSOR TIME.

7. UNUSUAL FEATURES OF THE PROGRAM - THE SETS PROGRAM IS AN INTERPRETIVE PROGRAM USED TO EXECUTE THE STATEMENTS OF A SETS USER PROGRAM. THE SETS USER PROGRAM PROVIDES THE USER WITH A FLEXIBLE CAPABILITY FOR ACHIEVING THE SYMBOLIC MANIPULATION OF SET EQUATIONS.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1974.
CDC6600 RESTRICTED DISTRIBUTION VERSION SUBMITTED OCTOBER 1973, REPLACED BY CDC6600B UNRESTRICTED VERSION DECEMBER 1974.

10. REFERENCES - R. B. WORRELL AND B. L. HULME, EFFICIENT ORDERING OF SET EXPRESSIONS FOR SYMBOLIC EXPANSION, JOURNAL OF THE ACM, VOL. 20, JULY 1973.
M. D. OLMAN AND R. B. WORRELL, A FAULT TREE REPRESEN-

10. REFERENCES (CONTINUED)
TATION DESIGNED FOR COMPUTER ANALYSIS, SC-RR-71 0615A, JULY 1972.
R. B. WORRELL, SET EQUATION TRANSFORMATION SYSTEM (SETS), SLA-73-0028A, MAY 1974, AND ADDENDUM, NOVEMBER 1974.
R. B. WORRELL, INSTRUCTIONS FOR USING THE SETS PROGRAM, SLA-73-0908A, OCTOBER 1974, AND ERRATA, NOVEMBER 1974.
B. L. HULME AND R. B. WORRELL, A PRIME IMPLICANT ALGORITHM WITH FACTORING, SLA-74-0218, MAY 1974.
R. B. WORRELL, USING THE SET EQUATION TRANSFORMATION SYSTEM IN FAULT TREE ANALYSIS, SAND74-0240, SEPTEMBER 1974.

11. MACHINE REQUIREMENTS - CDC6600 WITH EXTENDED CORE STORAGE (ECS)

12. PROGRAMMING LANGUAGE USED - FORTRAN EXTENDED

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.3.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - A SPECIAL ROUTINE WITH THE CALLING SEQUENCE CALL SETEP(I), WHERE I IS AN INTEGER OR AN INTEGER VARIABLE REPRESENTING A LOGICAL FILE NUMBER, IS USED TO ENABLE PARITY CHECKING WITHIN THE SETS PROGRAM FOR IRRECOVERABLE PARITY ERRORS. OTHERWISE, IRRECOVERABLE PARITY ERRORS WILL BE HANDLED BY SCOPE.

A SUBSTANTIAL REPROGRAMMING EFFORT WOULD BE REQUIRED TO CONVERT THE SETS PROGRAM TO A MACHINE THAT IS NOT COMPATIBLE WITH THE CDC6600 DUE TO THE EXTENSIVE USE OF MASKING INSTRUCTIONS AND THE PACKING OF DATA WITHIN THE 60-BIT WORD STRUCTURE.

15. NAME AND ESTABLISHMENT OF AUTHOR -
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (4149 CARDS)
SAMPLE PROBLEM (205 CARDS)
SAMPLE PROBLEM OUTPUT
REFERENCE REPORTS, SC-RR-71 0615A, SLA-73-0028A AND ADDENDUM, SLA-73-0908A AND ERRATA

17. CATEGORY - P
KEYWORDS - BOOLEAN ALGEBRA, SWITCHING THEORY, NETWORK THEORY, EVENT MODELS, FAULT TREE ANALYSIS

1. NAME OR DESIGNATION OF PROGRAM - GRAPH

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - THIS PROGRAM CALCULATES AND GRAPHS STATISTICAL RESULTS OF EXPERIMENTAL DATA. IT CALCULATES THE LINEAR REGRESSION, CORRELATION COEFFICIENTS, THE CONFIDENCE INTERVALS FOR 90-95-99 PERCENT CONFIDENCE THAT THE NEXT SAMPLE WILL BE WITHIN THE PRINTED INTERVAL, THE 90 PERCENT CONFIDENCE INTERVAL THAT 95 PERCENT OF THE REMAINING POPULATION WILL BE WITHIN, AND THE MEAN AND STANDARD DEVIATION OF EACH PARAMETER. THE PROGRAM GRAPHS THESE CONFIDENCE INTERVALS, THE REGRESSION LINE AND THE EXPERIMENTAL DATA TO OBTAIN A VISUAL INDICATION OF CORRELATION. INPUT DATA IS PRINTED IN TABULAR FORM AND ALL DEPENDENT DATA ARE DISPLAYED AGAINST ALL INDEPENDENT DATA, ONE PARAMETER AT A TIME.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - LESS THAN 1 SECOND IS REQUIRED FOR A TYPICAL PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - ROUTINE GRAPH CAN BE OVERLAYED BY GRAPH2 TO SAVE ABOUT 10000 BYTES.

8. RELATED AND AUXILIARY PROGRAMS - THIS PROGRAM IS THE ALO-JO189 PROGRAM TRANSFERRED FROM THE ALO-COSMIC COLLECTION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
IBM360 PROGRAM SUBMITTED SEPTEMBER 1974, SAMPLE PROBLEM EXECUTED BY ACC ON IBM370/195.

10. REFERENCES - HERMAN H. FAUCETTE AND W. J. KIRK, GRAPH - REGRESSION CONFID GRAPH, BENDIX CORPORATION COMPUTER PROGRAM REPORT, APRIL 19, 1967.

11. MACHINE REQUIREMENTS - 19,880 BYTES FOR PROGRAM

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
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15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)
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KANSAS CITY, MISSOURI 64141

16. MATERIAL AVAILABLE -
SOURCE DECK (818 CARDS)
OBJECT DECK (402 CARDS)
SAMPLE PROBLEM (837 CARDS)
SAMPLE PROBLEM OUTPUT (41 PAGES)
REFERENCE REPORT

17. CATEGORY - P
KEYWORDS - STATISTICS, GRAPHS, REGRESSION, CORRELATION, CONFIDENCE INTERVALS

ACC ABSTRACT 625 04/75

1. NAME OR DESIGNATION OF PROGRAM - VARI-1D

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE VARI-1D CODE CALCULATES ESTIMATES OF CHANGES IN REACTIVITY WORTHS, KEFF, REACTION RATES, POWER FRACTIONS, PROMPT-NEUTRON GENERATION TIME, DELAYED NEUTRON EFFECTIVENESS, AND FLUX INTEGRAL RATIOS DUE TO CHANGES IN NUCLEAR DATA OR COMPOSITION BY USE OF A VARIATIONAL FORMALISM. THE CODE IS APPLICABLE TO A WIDE RANGE OF REACTOR OR CRITICAL EXPERIMENT DESIGN PROBLEMS AND SENSITIVITY STUDIES.

4. METHOD OF SOLUTION - VARI-1D FIRST CALCULATES THE DIFFUSION THEORY FLUX AND ADJOINT IN THE REFERENCE ONE-DIMENSIONAL SYSTEM USING A STANDARD POWER ITERATION ALGORITHM WITH CHEBYSCHEV EXTRAPOLATION. NEXT, THE GENERALIZED FUNCTIONS GAMMA* AND GAMMA ARE CALCULATED USING A SUCCESSIVE APPROXIMATION METHOD WITH THE SOURCE TERM APPROPRIATE TO THE TYPE OF ESTIMATE. THESE GENERALIZED FUNCTIONS ARE THEN USED TO CALCULATE THE INTEGRALS REQUIRED TO OBTAIN VARIATIONAL AND FIRST-ORDER PERTURBATION THEORY ESTIMATES OF THE EFFECT OF DIFFERENT SYSTEM ALTERATIONS ON THE GIVEN REACTIVITY PERTURBATION, REACTION RATE RATIO, ETC.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   50 SPATIAL MESH POINTS
   10 MATERIAL REGIONS
   15 ISOTOPES
   10 FISSIONABLE ISOTOPES
   27 ENERGY GROUPS
   15 DOWNSCATTER GROUPS
   THE GEOMETRY IS ONE-DIMENSIONAL SLAB, CYLINDER, OR SPHERE. THE BOUNDARY CONDITIONS ARE PHI = 0 AND/OR PHI' = 0. CROSS SECTION DATA MAY BE INPUT FROM CARDS OR ARC SYSTEM XS.ISO FILE (ACC ABSTRACT 594) OR CCCC ISOTXS.

6. TYPICAL RUNNING TIME- THE CENTRAL PROCESSOR TIME FOR A SAMPLE PROBLEM WITH ONE REACTIVITY ESTIMATE AND 9 SYSTEM ALTERATIONS IS LESS THAN 30 SECONDS ON AN IBM360/195.

7. UNUSUAL FEATURES OF THE PROGRAM - VARI-1D ALLOWS THE ESTIMATION OF THE EFFECT ON REACTIVITY WORTH, ETC., OF MANY ALTERATIONS IN TEMPERATURE, COMPOSITION, OR NUCLEAR DATA TO BE MADE WITH A SINGLE SET OF FLUX, ADJOINT, AND GENERALIZED FUNCTIONS CALCULATED FOR A REFERENCE CONDITION. BOTH THE ARC SYSTEM XS.ISO AND CCCC FORMAT ISOTXS CROSS SECTION FILES ARE PROCESSED.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
   IBM360 VERSION SUBMITTED FEBRUARY 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - W. M. STACEY, JR. AND J. P. REGIS, VARI-1D: A ONE-DIMENSIONAL VARIATIONAL SENSITIVITY CODE, ARGONNE APPLIED PHYSICS DIVISION REPORT, AUGUST 1973.

W. M. STACEY, JR., VARIATIONAL ESTIMATES OF REACTIVITY WORTHS AND REACTION RATE RATIOS IN CRITICAL NUCLEAR REACTORS, NUCLEAR SCIENCE AND ENGINEERING, VOL. 48, P. 444, 1972.

W. M. STACEY, JR., AN IMPROVED REACTIVITY TABLE MODEL FOR LIQUID METAL FAST BREEDER REACTOR DYNAMICS, NUCLEAR SCIENCE AND ENGINEERING, VOL. 49, P. 213, 1972.

L. C. JUST, H. HENRYSON, II, A. S. KENNEDY, S. D. SPARCK, B. J. TOPPEL, AND P. M. WALKER, THE SYSTEMS ASPECTS AND INTERFACE DATA SETS OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM, ANL-7711, APRIL 1971.

B. M. CARMICHAEL, D. A. MENELEY, AND C. VONDY, REPORT OF THE SUBCOMMITTEE ON STANDARD INTERFACE FILES, LA-5324-MS, JULY 1973.

11. MACHINE REQUIREMENTS - A TYPICAL EXECUTION REQUIRES ABOUT 450K BYTES. ONE PERIPHERAL I/O DEVICE IS REQUIRED FOR A CROSS SECTION INPUT FILE.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV IS USED EXCEPT FOR SUBROUTINE SQUEZE WHICH IS IN ASSEMBLY LANGUAGE.

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (4688 CARDS)
LOAD MODULES (2314-270 BLOCKS, 3330-270 BLOCKS)
SAMPLE PROBLEM (350 CARDS)
SAMPLE PROBLEM OUTPUT (45 SELECTED PAGES)
LIBRARY (ISOTXS FORMAT 6 BLOCKS)
CONTROL INFORMATION (JCL 49 CARDS)
REFERENCE REPORT, APPLIED PHYSICS DIVISION REPORT

17. CATEGORY - C
KEYWORDS - REACTIVITY, REACTION RATES, 1-DIMENSIONAL

ACC ABSTRACT 626 08/74

1. NAME OR DESIGNATION OF PROGRAM - ARC-DIF1D

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE ARC 1D-DIFFUSION CAPABILITY PROVIDES COMPLETE ONE-DIMENSIONAL SOLUTIONS OF THE MULTIGROUP DIFFUSION EQUATIONS WITH EDITS AND A NEUTRON INVENTORY ON OPTION.

4. METHOD OF SOLUTION - THIS PACKAGE CONSISTS OF FOUR MODULES THAT ARE INVOKED BY THE PATH STP001. THE MODULE NUC002 SOLVES THE MULTIGROUP DIFFUSION EQUATIONS. THE MODULE NUC004 HANDLES SEARCHES. THE MODULE NUE001 PROVIDES MORE DETAILED EDITS, IF DESIRED. THE PATH INVOKES OTHER MODULES TO PROVIDE FOR CROSS SECTION HOMOGENIZATION AND THE PROCESSING OF INPUT DATA.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM PROVIDED REQUIRES ABOUT 66 SECONDS ON AN IBM360/195.

7. UNUSUAL FEATURES OF THE PROGRAM - THE MODULAR DESIGN ALLOWS THE USE OF ANY OR ALL OF THE MODULES IN THIS PACKAGE WITH OTHER DESIRED MODULES WITH DATA COMMUNICATED VIA INTERFACE DATA SETS.

8. RELATED AND AUXILIARY PROGRAMS - THE PATH STP001 IS INVOKED BY EXECUTING THE CATALOGUED PROCEDURE ARCSP001. THE ARC SYSTEM ENVIRONMENT IS PROVIDED BY ARC-SYSTEM (ACC ABSTRACT 522). THE RCD INPUT IS PROCESSED BY ARC-NUI002 (ACC ABSTRACT 533). THE CROSS SECTION HOMOGENIZATION IS PROVIDED BY ARC-XSEC1 (ACC ABSTRACT 594). CROSS SECTION DATA FOR THE SAMPLE PROBLEM ARE PROVIDED IN THE ACC 594 PACKAGE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
IBM360 VERSION SUBMITTED FEBRUARY 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - D. E. NEAL, G. K. LEAF, AND A. S. KENNEDY, THE ARC SYSTEM ONE-DIMENSIONAL DIFFUSION THEORY CAPABILITY, CARC1D, ANL-7715, MAY 1971.

D. E. NEAL, T. A. DALY, D. A. SCHOENGOLD, G. JENSEN MAIN, E. A. KOVALSKY, AND G. K. LEAF, THE ARC SYSTEM ONE-DIMENSIONAL ADJUNCT CALCULATIONS AND EDITS, ANL-7719, MARCH 1972.

W. L. WOODRUFF, T. A. DALY, H. HENRYSON, II, P. H. KIER, J. P. REGIS, C. G. STENBERG, AND B. J. TOPPEL, THE ARC SYSTEM STANDARD PATHS AND CATALOGUED PROCEDURES, ANL-7712, DECEMBER 1971.

L. C. JUST, H. HENRYSON, II, A. S. KENNEDY, S. D. SPARCK, B. J. TOPPEL, AND P. M. WALKER, THE SYSTEM ASPECTS AND INTERFACE DATA SETS OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM, ANL-7711, APRIL 1971.

10. REFERENCES (CONTINUED)
SUPPLEMENTAL INFORMATION FOR ARC-DIF1D, ANL-AP NOTE, FEBRUARY 1974.

11. MACHINE REQUIREMENTS - 260K BYTES OF CORE AND AT LEAST 2 PERIPHERAL I/O DEVICES FOR SCRATCH FILES IN ADDITION TO FILES FOR THE LOAD MODULE LIBRARY AND CROSS SECTION DATA.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

AUTHORS D. E. NEAL, G. K. LEAF, AND A. S. KENNEDY

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ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (PDS DIF1D.SOURCE 1597 RECORDS)
OBJECT MODULE (PDS DIF1D.SEGLIB 651 RECORDS)
LOAD MODULE (2314 PDS DIF1D.MODLIB 968 RECORDS)
SAMPLE PROBLEM (162 CARDS)
SAMPLE PROBLEM OUTPUT (87 SELECTED PAGES)
LINKAGE EDITOR CONTROL STATEMENTS (PDS DIF1D.OVERLAY 6 RECORDS)
CONTROL INFORMATION (JCL 54 CARDS)
REFERENCE REPORTS AND SUPPLEMENTAL INFORMATION NOTE

17. CATEGORY - C
KEYWORDS - MODULAR, MULTIGROUP, 1-DIMENSIONAL, DIFFUSION THEORY, ARC CODES

1. NAME OR DESIGNATION OF PROGRAM - TOODY2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC3600

3. DESCRIPTION OF PROBLEM OR FUNCTION - TOODY2 IS USED TO COMPUTE WAVE PROPAGATION IN TWO DIMENSIONS IN RECTANGULAR OR CYLINDRICAL COORDINATES.

4. METHOD OF SOLUTION - TOODY2 IS BASED ON THE CONVENTIONAL FINITE DIFFERENCE ANALOGS TO THE LAGRANGIAN EQUATIONS OF MOTION. THE FINITE DIFFERENCE TECHNIQUE IS AN APPROXIMATE METHOD OF SOLVING THE NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS DESCRIBING TWO-DIMENSIONAL MOTION. THE DEGREE OF APPROXIMATION DEPENDS ON THE MESH SIZES, MESH SHAPE, AND ARTIFICIAL VISCOSITY COEFFICIENTS WHICH ARE USED. FOUR TYPES OF BOUNDARY CONDITIONS ARE CONSIDERED. THESE ARE (1) A FREE SURFACE, (2) A SURFACE WITH AN APPLIED STRESS ACTING ON IT, (3) A SYMMETRY PLANE, AND (4) A RIGID NON-SLIDING BOUNDARY.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMUM OF - 19 DIFFERENT MATERIALS PER PROBLEM

6. TYPICAL RUNNING TIME - TOODY2 CAN CALCULATE 3.3*10**5 MESH CYCLES PER HOUR.

7. UNUSUAL FEATURES OF THE PROGRAM - TOODY2 FEATURES INCLUDE -
   (1) INTERMEDIATE TAPE STORAGE IS USED. THE VALUES OF PROPERTIES COMPUTED ARE WRITTEN ON THESE TAPES AFTER THEY HAVE BEEN COMPUTED. AFTER THE COMPUTATION HAS PROCEEDED AND THESE VALUES ARE AGAIN REQUIRED, THEY ARE READ FROM THESE TAPES. THIS ALLOWS VALUES TO BE STORED OUTSIDE OF THE COMPUTER MEMORY WHEN THEY ARE NOT BEING USED IN THE CALCULATIONS.
   (2) A SLIDING INTERFACE OPTION IS INCLUDED. THIS OPTION YIELDS A MORE ACCURATE DESCRIPTION OF THE PROBLEM WHEN THE MOTION OF TWO ADJACENT MESHES IS VERY DIFFERENT. FURTHER, THIS ALLOWS MORE CONVENIENT ZONING WHEN MORE THAN ONE MATERIAL IS INVOLVED. EIGHT SLIDING INTERFACES CAN BE USED PER PROBLEM AND THE INTERFACE FRICTION CAN BE SPECIFIED AS ZERO, INFINITE, OR FINITE.

8. RELATED AND AUXILIARY PROGRAMS - TOODY2 IS ALO-008 TRANSFERRED FROM THE ALO-COSMIC COLLECTION. IT IS AN IMPROVED VERSION OF TOODY.

9. STATUS - ABSTRACT FIRST DISTRIBUTED APRIL 1974.
   CDC3600 VERSION SUBMITTED FEBRUARY 1974.

10. REFERENCES - L. D. BERTHOLF AND S. E. BENZLEY, TOODY II, A COMPUTER PROGRAM FOR TWO-DIMENSIONAL WAVE PROPAGATION, SC-RR-68-41, NOVEMBER 1968.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - 3600 FORTRAN

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 6.2.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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SANDIA LABORATORIES
P. O. BOX 5800
ALBUQUERQUE, NEW MEXICO 87115

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECK (4036 CARDS)
    SAMPLE PROBLEM (42 CARDS)
    SAMPLE PROBLEM OUTPUT (14 PAGES)
    REFERENCE REPORT

17. CATEGORY - X
    KEYWORDS - 2-DIMENSIONAL, WAVE PROPAGATION, STRESSES, HYDRODYNAMICS

ACC ABSTRACT 628 03/75

1. NAME OR DESIGNATION OF PROGRAM - ETOT-3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC7600

3. DESCRIPTION OF PROBLEM OR FUNCTION - ETOT-3 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B FORMAT (REFERENCE 3) AND PRODUCES DATA DECKS FOR USE IN GENERATION OF KATE, THERMOS, TEMPEST AND LASER LIBRARIES.

4. METHOD OF SOLUTION - ETOT-3 PERFORMS A STRAIGHT-FORWARD GROUP AVERAGE USING AN INPUT WEIGHTING FUNCTION OR TAKES POINT VALUES OF THE MICROSCOPIC DATA FROM THE ENDF/B FILES. THE BREIT-WIGNER SINGLE-LEVEL AND MULTI-LEVEL FORMULAE ARE AVAILABLE. THE REICH-MOORE AND ADLER-ADLER FORMULAE ARE NOT INCLUDED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - IN ADDITION TO THE RESTRICTIONS ON THE ENDF/B DATA ITSELF, ETOT-3 HAS THE FOLLOWING RESTRICTIONS: MAXIMA OF -
   309 GROUPS OR POINTS
   500 RESOLVED RESONANCES
   ETOT-3 WILL PROCESS ENDF/B-III DATA. A PREDIGESTED FILE CALLED THE UNIVERSAL SUPERGROUP SYSTEM (SEE ETOT-3 DOCUMENT) IS ALSO ACCEPTABLE.

6. TYPICAL RUNNING TIME - ABOUT 5 SECONDS PER ISOTOPE ARE REQUIRED ON THE 7600 WITH ADDITIONAL TIME DEPENDENT ON THE NUMBER OF RESONANCE PARAMETERS AND RESONANCE ENERGY REGIONS.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - IN THE PROGRAM, USE IS MADE OF THE GENERAL PURPOSE PROCESSOR AND RETRIEVAL SUBROUTINES (REFERENCE 12) WRITTEN AT BROOKHAVEN FOR HANDLING ENDF/B DATA FILES. THIS PROGRAM IS RELATED TO ETOG-3 (ACC ABSTRACT 538) WHICH GENERATES EPITHERMAL CROSS SECTIONS.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1974.
   CDC7600 VERSION SUBMITTED FEBRUARY 1974.

10. REFERENCES - M. RAYMUND, SUPPLEMENT TO WCAP-7363, ETOT, A FORTRAN-IV PROGRAM TO PROCESS DATA FROM THE ENDF/B FILE TO THERMAL LIBRARY FORMAT, WCAP-7363 (ENDF-146) SUPPLEMENT, NOVEMBER 1973.
C. L. BEARD AND R. A. DANNELS, ETOT, A FORTRAN-IV PROGRAM TO PROCESS DATA FROM THE ENDF/B FILE TO THERMAL LIBRARY FORMAT, WCAP-7363 (ENDF-146), MARCH 1971.
M. K. DRAKE, ED., DATA FORMATS AND PROCEDURES FOR THE ENDF NEUTRON CROSS SECTION LIBRARY, BNL-50274 (ENDF-102), VOL. 1, OCTOBER 1970.
D. E. KUSNER, R. A. DANNELS AND S. KELLMAN, ETOG-1, A FORTRAN-IV PROGRAM TO PROCESS DATA FROM THE ENDF/B FILE TO THE MUFT, GAM, AND ANISN FORMATS, WCAP-3845-1 (ENDF-114), DECEMBER

10. REFERENCES (CONTINUED)

1969.

M. RAYMUND, SUPPLEMENT TO WCAP-3845-1, ETOG-1, A FORTRAN-IV PROGRAM TO PROCESS DATA FROM THE ENDF/B FILE TO THE MUFT, GAM AND ANISN FORMATS, WCAP-3845-1 SUPPLEMENT, AUGUST 1973.

C. G. PONCELET, LASER--A DEPLETION PROGRAM FOR LATTICE CALCULATIONS BASED ON MUFT AND THERMOS, WCAP-6073, APRIL 1966.

H. AMSTER AND R. SUAREZ, THE CALCULATION OF THERMAL CONSTANTS AVERAGED OVER A WIGNER-WILKINS FLUX SPECTRUM: DESCRIPTION OF THE SOFOCATE CODE, WAPD-TM-39, JANUARY 1957.

R. H. SHUDDE AND J. DYER, TEMPEST II, A NEUTRON THERMALIZATION CODE, AMTD-111, JUNE 1962.

H. J. AMSTER AND J. B. CALLAGHAN, KATE-1, A PROGRAM FOR CALCULATING WIGNER-WILKINS AND MAXWELLIAN AVERAGED THERMAL CONSTANTS ON THE PHILCO-2000, WAPD-TM-232, OCTOBER 1960.

R. H. SHUDDE, PREPARATION OF SQUARE ROOT OF E SIGMA CROSS SECTIONS FOR THE TEMPEST DECIMAL LIBRARY, AMTC-115, NOVEMBER 1961.

H. C. HONECK, THERMOS--A THERMALIZATION TRANSPORT THEORY CODE FOR REACTOR LATTICE CALCULATIONS, BNL-5826, SEPTEMBER 1961.

O. OZER, ED., DESCRIPTION OF THE ENDF/B PROCESSING CODES AND RETRIEVAL SUBROUTINES, ENDF-110, NATIONAL NEUTRON CROSS SECTION CENTER, BROOKHAVEN NATIONAL LABORATORY, REVISED JUNE 1971.

11. MACHINE REQUIREMENTS - CORE STORAGE REQUIRED BY THE PROGRAM, ASSOCIATED SYSTEM LIBRARY FUNCTIONS, AND SCOPE 2.0 OPERATING SYSTEM IS 50,000 LOCATIONS. THE PROGRAM USES ONE SCRATCH TAPE IN ADDITION TO THE LIBRARY TAPE AND STANDARD INPUT, OUTPUT AND PUNCH UNITS.

12. PROGRAMMING LANGUAGE USED - ANSI STANDARD FORTRAN (FORTRAN IV)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 2.0.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - PLEASE NOTE THAT THE GRAPH OPTION IS NOT OPERATIONAL, AND BINARY TAPE MODE HAS NOT BEEN TESTED ON THE CDC7600.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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PITTSBURGH, PENNSYLVANIA 15230

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (5842 CARDS)
SAMPLE PROBLEM (5 CARDS)
CDC UPDATE SOURCE DECK (5883 CARDS)
REFERENCE REPORTS, WCAP-7363 (ENDF-146) AND SUPPLEMENT TO WCAP-7363 (ENDF-146)

17. CATEGORY - B
KEYWORDS - ENDF/B, CROSS SECTIONS, LIBRARIES, KATE CODES, THERMOS CODES, TEMPEST CODES, LASER CODES

ACC ABSTRACT 629 04/75

1. NAME OR DESIGNATION OF PROGRAM - ORRIBLE

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - ORRIBLE IS A GROUP OF PROGRAMS USED TO PREDICT FLOW AND TEMPERATURE DISTRIBUTION FOR STEADY SINGLE-PHASE FLOW THROUGH BUNDLES OF HEATED RODS SEPARATED BY HELICAL WIRE-WRAP SPACERS. ANY COMBINATION OF FLOW SUBCHANNELS CAN BE BLOCKED AT THE INLET. TURBULENT INTERACTION, SWEEPING CROSS FLOW DUE TO THE WIRE WRAP, AND TRANSVERSE THERMAL CONDUCTION ARE CONSIDERED. THE ELEVEN ORRIBLE PROGRAMS IN THE PACKAGE ARE FOR THREE DUCT CONFIGURATIONS OF 19-ROD BUNDLES, AND FOR 37-, 91-, AND 217-ROD BUNDLES IN HEXAGONAL DUCTS. IN THREE VERSIONS, PERIODIC CHANNEL AREA VARIATIONS DUE TO THE WIRE WRAPS MOVING THROUGH CHANNELS AND THE POSSIBILITY OF THE ROD BUNDLE FORMING A HELIX IN THE DUCT ARE CONSIDERED.

4. METHOD OF SOLUTION - AN APPROXIMATE RELATIONSHIP FOR PRESSURE-DIVERSION CROSS FLOW IN TERMS OF LOCAL AXIAL MASS VELOCITIES IS USED TO ELIMINATE PRESSURE AS A VARIABLE; HENCE THE COMPUTATIONAL PROCEDURE DOES NOT REQUIRE ITERATIVE TECHNIQUES. EACH FLOW CHANNEL IS ASSUMED TO BE DIVIDED INTO A FIXED NUMBER OF LENGTH INCREMENTS, DX. IF, FOR A GIVEN VALUE OF X, VALUES OF THE CHANNEL AXIAL MASS VELOCITY AND TEMPERATURE ARE KNOWN, THE CROSS FLOWS AT X CAN BE CALCULATED AND THEN THE AXIAL MASS VELOCITY AND TEMPERATURE AT X+DX. SINCE THE INLET CONDITIONS ARE SPECIFIED, THE CONDITIONS AT EACH SUCCESSIVE INCREMENT CAN BE CALCULATED UNTIL THE OUTLET IS REACHED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - FOR EACH PROGRAM, THE COMPONENT DIMENSIONS, FLOW PARAMETERS, THERMAL PARAMETERS, ETC. MAY BE VARIED WITHIN REASONABLE LIMITS. A NEW PROGRAM MUST BE WRITTEN IN ORDER TO STUDY THE EFFECT OF A DIFFERENT DUCT CROSS-SECTION SHAPE OR A DIFFERENT ROD ARRANGEMENT.

6. TYPICAL RUNNING TIME - 0.5 TO 2 MINUTES ARE REQUIRED.

7. UNUSUAL FEATURES OF THE PROGRAM - AN APPROXIMATE RELATIONSHIP FOR PRESSURE-DIVERSION CROSS FLOW IN TERMS OF LOCAL AXIAL MASS VELOCITIES IS USED TO ELIMINATE PRESSURE AS A VARIABLE; HENCE THE COMPUTATION DOES NOT REQUIRE ITERATIVE PROCEDURES.

8. RELATED AND AUXILIARY PROGRAMS - COBRA3C (ACC ABSTRACT 432)

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1975.
IBM360 VERSION SUBMITTED AUGUST 1974, SAMPLE PROBLEMS EXECUTED BY ACC ON IBM370/195, DECEMBER 1974.

10. REFERENCES - J. L. WANTLAND, ORRIBLE - A SERIES OF COMPUTER PROGRAMS FOR FLOW AND TEMPERATURE DISTRIBUTION IN LMFBR FUEL ROD BUNDLES OF DIFFERENT SIZES AND CONFIGURATIONS, ORNL-TM-4384, MARCH 1974.

11. MACHINE REQUIREMENTS - NO SAMPLE PROBLEM REQUIRED MORE THAN 120K BYTES DURING EXECUTION. THE THREE PROGRAMS FOR 217-ROD BUNDLES REQUIRED 400K BYTES FOR COMPILATION.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
    SOURCE DECKS (4719 CARDS)
    SAMPLE PROBLEMS (181 CARDS)
    SAMPLE PROBLEM OUTPUT (40 SELECTED PAGES AND 1 MICROFICHE)
    REFERENCE REPORT

17. CATEGORY - H
    KEYWORDS - TEMPERATURE DISTRIBUTION, FLOW DISTRIBUTION, FLOW BLOCKAGE, LMFBR REACTORS

1. NAME OR DESIGNATION OF PROGRAM - LATIN SQ

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/50

3. DESCRIPTION OF PROBLEM OR FUNCTION - LATIN SQ IS USED FOR THE STATISTICAL ANALYSIS OF DATA GENERATED FROM AN N X N LATIN SQUARE EXPERIMENTAL DESIGN. THE PROGRAM OUTPUT INCLUDES AN ANALYSIS OF VARIANCE TABLE FOR TESTING THE SIGNIFICANCE OF THE ROW, COLUMN AND TREATMENT MAIN EFFECTS. THE ANALYSIS OF VARIANCE TABLE ALSO INCLUDES INFORMATION FOR TESTING THE LINEAR AND HIGHER ORDER CURVILINEAR COMPONENTS FOR EACH MAIN EFFECT. A SUBROUTINE IS PROVIDED FOR PERFORMING DUNCAN'S NEW MULTIPLE RANGE TEST FOR MAKING ALL PAIR-WISE COMPARISONS AMONG THE FACTOR LEVEL MEAN VALUES.

4. METHOD OF SOLUTION - LATIN SQ EMPLOYS THE STANDARD METHOD OF ANALYSIS OF VARIANCE IN CALCULATING THE VARIOUS SUMS OF SQUARES, DEGREES OF FREEDOM, AND MEAN SQUARES FOR THE ANALYSIS OF VARIANCE TABLE (SEE REFERENCE 8). THE PARTITIONING OF THE MAIN EFFECTS INTO LINEAR AND HIGHER ORDER CURVILINEAR COMPONENTS IS ACCOMPLISHED BY THE USE OF ORTHOGONAL POLYNOMIAL COEFFICIENTS. THE COMPARISONS AMONG MEAN VALUES IS PERFORMED BY THE METHOD OF DAVID B. DUNCAN (SEE REFERENCE 2).

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE PROGRAM IS DESIGNED TO HANDLE LATIN SQUARES OF SIZE 3 X 3, 4 X 4, ..., 10 X 10. AN ERROR MESSAGE WILL RESULT IF THIS RESTRICTION IS VIOLATED.

6. TYPICAL RUNNING TIME - EXECUTION OF THREE SAMPLE LATIN SQUARE PROBLEMS OF SIZE 3 X 3, 4 X 4, AND 5 X 5 REQUIRES APPROXIMATELY 3 MINUTES.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED FEBRUARY 1975.
IBM360 VERSION SUBMITTED JANUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - ANTHONY D. GRANDILLO, ANALYSIS OF VARIANCE OF AN N X N LATIN SQUARE, WITH A SUBROUTINE FOR DUNCAN'S NEW MULTIPLE RANGE TEST, MONSANTO RESEARCH CORPORATION.

D. B. DUNCAN, MULTIPLE RANGE AND MULTIPLE F TESTS, BIOMETRICS, VOL.II, PP.1-42, MARCH 1955.

J. L. JAECH, THE LATIN SQUARE, JOURNAL OF QUALITY TECHNOLOGY, VOL.1, PP.242-255, OCTOBER 1969.

C. A. BENNETT AND N. L. FRANKLIN, STATISTICAL ANALYSIS IN CHEMISTRY AND THE CHEMICAL INDUSTRY, JOHN WILEY AND SONS, INC., NEW YORK, N. Y., 1961.

O. L. DAVIS, THE DESIGN AND ANALYSIS OF INDUSTRIAL EXPERIMENTS, HAFNER PUBLISHING COMPANY, NEW YORK, 1956.

10. REFERENCES (CONTINUED)

A. J. DUNCAN, QUALITY CONTROL AND INDUSTRIAL STATISTICS, RICHARD D. ERWIN, INC., HOMEWOOD, ILLINOIS, 1960.

C. R. HICKS, FUNDAMENTAL CONCEPTS IN THE DESIGN OF EXPERIMENTS, HOLT AND RINEHART, AND WINSTON, INC., 1964.

N. L. JOHNSON AND F. C. LEONE, STATISTICS AND EXPERIMENTAL DESIGN IN ENGINEERING AND THE PHYSICAL SCIENCES, VOLS. I AND II, JOHN WILEY AND SONS, NEW YORK, N. Y., 1964.

H. L. HARTER, ORDER STATISTICS AND THEIR USE IN TESTING AND ESTIMATION, VOL.1, AEROSPACE RESEARCH LABORATORIES, U. S. AIR FORCE, 1969.

11. MACHINE REQUIREMENTS - 25K MEMORY

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - DOS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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MONSANTO RESEARCH CORPORATION
MOUND LABORATORY
MIAMISBURG, OHIO 45342

16. MATERIAL AVAILABLE -
    SOURCE DECK (372 CARDS)
    OBJECT DECK (171 CARDS)
    SAMPLE PROBLEM (62 CARDS)
    CONTROL INFORMATION (JCL 14 CARDS)
    REFERENCE REPORT, MONSANTO RESEARCH CORPORATION DOCUMENT

17. CATEGORY - P
    KEYWORDS - ANALYSIS OF VARIANCE, STATISTICS, LATIN SQUARE

1. NAME OR DESIGNATION OF PROGRAM - RAFFLE-ANC

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360/75,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - RAFFLE IS A THREE-DIMENSIONAL GENERAL-PURPOSE MONTE CARLO PROGRAM FOR THE SOLUTION OF STATIC NEUTRON TRANSPORT PROBLEMS. EITHER FISSION SOURCE ITERATION OR EXTERNAL SOURCE PROBLEMS CAN BE SOLVED. REACTION RATES AND FLUXES OR CELL-AVERAGED P0 AND P1 TRANSFER MATRICES CAN BE OBTAINED FOR UP TO 100 INPUT ENERGY GROUPS. MULTIPLICATION FACTORS, LIFETIMES, GENERATION TIMES, AND PROBABLE ERRORS ARE ALSO COMPUTED. GROUP-WISE CURRENTS FROM ANY REGION TO ADJACENT REGIONS CAN BE COMPUTED.

4. METHOD OF SOLUTION - A MONTE CARLO METHOD IS USED WITH OPTIONS OF PATH TYPE, RAY TYPE, OR KENO SCORING TECHNIQUES. STANDARD BIASING TECHNIQUES INCLUDING WEIGHT, REDUCTION, NEUTRON SPLITTING, AND RUSSIAN ROULETTE ARE AVAILABLE.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMA OF -
   100 ENERGY GROUPS FOR EDITING
   200 SURFACES
   400 REGIONS

6. TYPICAL RUNNING TIME - RUNNING TIME IS VERY PROBLEM DEPENDENT, BUT OFTEN 1 TO 2 HOURS ARE REQUIRED ON AN IBM360/75. THE SAMPLE PROBLEM REQUIRES 1 MINUTE WHEN RUNNING ON AN IBM370/195 USING THE LOAD MODULE.

7. UNUSUAL FEATURES OF THE PROGRAM - FEATURES INCLUDE THE COMBINED USE OF MULTIGROUP AND POINTWISE CROSS SECTIONS, OPTIONAL USE OF MULTIGROUP THERMAL CROSS SECTIONS, AND THE SOLUTION OF EXTERNAL SOURCE PROBLEMS.

8. RELATED AND AUXILIARY PROGRAMS - THE INCITE PROGRAM (ACC ABSTRACT 565) CAN BE USED TO PREPARE THE MULTIGROUP THERMAL LIBRARIES USED BY RAFFLE.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
   IBM360 VERSION SUBMITTED OCTOBER 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - W. E. VESELY, F. J. WHEELER, AND R. S. MARSDEN, THE RAFFLE GENERAL PURPOSE MONTE CARLO CODE, ANCR-1022, APRIL 1973.
    RAFFLE NOTES, AEROJET MEMORANDUM, OCTOBER 1974, REVISED BY ACC.

11. MACHINE REQUIREMENTS - 570K BYTES OF CORE

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

W. E. VESELY*, F. J. WHEELER, AND R. S. MARSDEN
AEROJET NUCLEAR COMPANY
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* NOW AT THE NATIONAL REGULATORY COMMISSION

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (12,988 CARDS)
2314 LOAD MODULE (301 BLOCKS)
SAMPLE PROBLEM (110 CARDS)
SAMPLE PROBLEM OUTPUT (16 PAGES)
CONTROL INFORMATION (JCL 72 CARDS)
LIBRARIES (FAST 4288 CARDS, THERMAL 784 CARDS, MASTER FAST 5316 CARDS)
REFERENCE REPORT AND MEMORANDUM

17. CATEGORY - C
KEYWORDS - MONTE CARLO METHOD, TRANSPORT THEORY, REACTIVITY, FLUX DISTRIBUTION, REACTION RATES, INCITE CODES

1. NAME OR DESIGNATION OF PROGRAM - MMM3

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - MMM3 COMPUTES THE EIGENVALUES (FREQUENCIES) AND EIGENVECTORS (NORMAL MODES) FOR A SEMI-RIGID MOLECULE, AND COMPUTES THE TRANSFORMATION MATRIX FOR EXPRESSING THE CARTESIAN DISPLACEMENTS OF THE ATOMS IN TERMS OF THE NORMAL COORDINATES. COMPUTATION OF THE EFFECTIVE ATOMIC MASSES AND MEAN-SQUARED AMPLITUDES OF VIBRATION FOR USE IN SLOW NEUTRON SCATTERING CALCULATIONS IS INCLUDED AS WELL.

4. METHOD OF SOLUTION - THE PROCEDURE CENTERS AROUND THE MANIPULATION OF MATRICES; 1) THE FORCE CONSTANT MATRIX, 2) THE TRANSFORMATION MATRIX WHICH DESCRIBES CHANGES IN BOND ANGLES AND DISTANCES, AND 3) THE NEW COORDINATE MATRIX. IN FORMULATING A PROBLEM FOR SOLUTION, THE GROUP VIBRATION METHOD IS USED, I. E. A MOLECULE IS DIVIDED INTO GROUPS OF ATOMS WITH EACH ATOM IN ONE AND ONLY ONE GROUP, AND THE MOTION OF EACH ATOM IS DESCRIBED AS THE SUM OF DISPLACEMENTS WITHIN A GROUP (INTRAGROUP MOTIONS), TOGETHER WITH TRANSLATIONAL AND ROTATIONAL MOTIONS OF THE GROUPS CONSIDERED AS RIGID UNITS (SKELETAL MOTIONS).

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MATRICES WITH DIMENSIONS UP TO 55 X 55 ARE ACCEPTABLE.

6. TYPICAL RUNNING TIME - 3 SECONDS ARE REQUIRED TO EXECUTE THE SAMPLE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - THE GROUP VIBRATION APPROACH SYSTEMATIZES AND SIMPLIFIES PREPARATION OF THE INPUT DATA.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1974.
IBM360 VERSION SUBMITTED APRIL 1974, SAMPLE PROBLEM EXECUTED BY ACC JUNE 1974.

10. REFERENCES - D. H. SPEAS, MATRIX ROUTINE FOR CALCULATING NORMAL MODES, FREQUENCIES, AND ATOM DISPLACEMENTS IN MOLECULES, AEROJET NUCLEAR COMPANY PROGRAM DESCRIPTION NO. PDJ320, AUGUST 1964.
H. L. MCMURRY, A SIMPLIFIED GROUP VIBRATION METHOD FOR CALCULATING NORMAL VIBRATIONS OF LARGE MOLECULES, SPECTROCHIMICA ACTA, VOL. 21, PP. 2091-2103, 1965.
H. L. MCMURRY AND D. SPEAS, VIBRATIONAL ANALYSIS OF PROPANE AND ITS SYMMETRICAL DEUTERIUM SUBSTITUTED ISOMERS, SPECTROCHIMICA ACTA, VOL. 21, PP. 2105-2117, 1965.

11. MACHINE REQUIREMENTS - 30CK BYTES OF MEMORY

12. PROGRAMMING LANGUAGE(S) USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - IF A DEGENERACY EXISTS, THE EIGENVALUES ARE CALCULATED CORRECTLY, BUT THE EIGENVECTORS MAY BE WRONG UNLESS SPECIAL PRECAUTIONS ARE EMPLOYED IN FORMULATING THE PROBLEM. THE PROCEDURE TO BE FOLLOWED IN SUCH CASES IS GIVEN IN THE PROGRAM INSTRUCTIONS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

H. L. MCMURRY AND D. H. SPEAS
AEROJET NUCLEAR COMPANY
550 SECOND STREET
IDAHO FALLS, IDAHO 83401

16. MATERIAL AVAILABLE -
    SOURCE DECK (527 CARDS)
    SAMPLE PROBLEM (258 CARDS)
    SAMPLE PROBLEM OUTPUT (22 PAGES)
    REFERENCE DOCUMENTS

17. CATEGORY - W
    KEYWORDS - EIGENSYSTEMS, COORDINATE ANALYSES, MOLECULES, SLOW NEUTRON SCATTERING

1. NAME OR DESIGNATION OF PROGRAM - LOS ALAMOS SUBROUTINE LIBRARY

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - LOS ALAMOS SUBROUTINE LIBRARY IS A SUBSET OF THE CDC6600 SUBROUTINE LIBRARY OF LOS ALAMOS SCIENTIFIC LABORATORY. THIS SUBSET INCLUDES LIBRARY CATEGORIES A-W:

IDENTIFICATION			DESCRIPTION
A101A	COM	UNPAK	UNPACK A FLOATING POINT NUMBER
A102A	COM	IUNPK	UNPACK A FLOATING POINT NUMBER
A202A	F4	DCABS	ABSOLUTE VALUE OF D.P. COMPLEX NUMBER
A203A	COM	CABS	MAGNITUDE OF A COMPLEX NUMBER
B104A	COM	ATAN	ARCTANGENT OF X OR OF Y/X
B106A	COM	SINCOS	SINE OR COSINE FOR ARG. IN RAD. & DEG.
B107A	F4	TAN	FL. PT. TANGENT OR COTANGENT ROUTINE
B108A	COM	ASIN	ARCSINE OR ARCCOSINE
B109A	COM	CSIN	SINE OR COSINE OF A COMPLEX NUMBER
B203A	COM	SINH	HYPERBOLIC SINE & COSINE
B204A	COM	TANH	HYPERBOLIC TANGENT
B306A	COM	EXP	EXPONENTIAL FUNCTION E**X
B307A	COM	CLOG	COMPLEX NATURAL LOG
B310A	COM	CEXP	NATURAL EXPONENTIAL OF A COMPLEX NUMBER
B313A	COM	DBAIEX	EVAL. DX**N WHERE DX IS D.P. & N IS INT.
B407A	COM	CUBRT	CUBE ROOT FORTRAN IV SINGLE PRECISION
B408A	COM	SQRT	SQUARE ROOT
B409A	COM	CSQRT	COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
C302A	F4	GAMMA	INCOMPLETE GAMMA FUNCTION
C304A	F4	ELLI	COMPLETE & INCOMPLETE ELLIPTIC INTEGRALS
C309A	F4	E1	EXPONENTIAL INTEGRAL E1(X)
C310A	F4	ERF	ERROR FUNCTION
C325A	F4	GAM1	GAMMA FUNCTION
C326A	F4	LNGAM	CMPLX NAT. LOG OF GAMMA FN. WITH CMPLX ARG.
C327A	F4	BASF	BESSEL FUNCTIONS FOR LARGE REAL ARGUMENTS
C328A	F4	BJYIK	BESSEL FNS. FOR REAL ORDER & ARGUMENT
D301A	F4	TBPSDN	TRUNCATED BUNEMAN POISSON SOLVER
E102A	F4	SPL1D1	SPLINE INTERPOLATION-COEFFICIENT EVAL.
E103A	F4	SPL1D2	SPLINE INTERPOLATION-FUNCTION EVALUATION
E104A	F4	SPL2D1	2-D BI-CUBIC SPLINE INTERP.-COEFF. CALC.
E105A	F4	SPL2D2	2-D BI-CUBIC SPLINE INTERP.-FUNCT. EVAL.
E106A	F4	AKNINT	INTERPOLATION BY AITKENS REPEATED PROCESS
E107A	F4	SPL2D3	SPLINE INTERP. FN. TO BE USED WITH E105A
E203A	F4	SMOOTH	LEAST-SQUARE SPLINE APPROXIMATION
E208A	F4	PFTS	ORTHOGONAL POLYNOMIAL LEAST SQUARES
F115A	F4	MAXV	VECTOR MAX., MIN., MAX. ABS. OR MIN. ABS.
F116A	F4	MAXM	MATRIX MAX., MIN., MAX. ABS., MIN. ABS.
F119A	F4	MATTRS	MATRIX TRANSPOSE IN PLACE
F120A	F4	MATMOV	MATRIX MOVE
F121A	F4	MATTRA	MATRIX MOVE & TRANSPOSE
F122A	F4	MATMPY	MATRIX MULTIPLY ROUTINE
F123A	F4	MTMPY	MATRIX TRANSPOSE MULTIPLY ROUTINE
F124A	COM	DOTPRO	INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)

3. DESCRIPTION OF PROBLEM OR FUNCTION (CONTINUED)

F128A F4	MGS	MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION
F132A F4	MATINV	MATRIX INVERSE
F133A CCM	VECSUM	VECTOR ADDITION
F134A F4	ECMATPY	ECS MATRIX MULTIPLY
F135A F4	ECMTRPY	ECS MATRIX TRANSPOSE MULTIPLY
F136A F4	CCTPRO	INNER PRODUCT OF TWO COMPLEX VECTORS
F137A F4	CATINV	COMPLEX MATRIX INVERSION
F139A CCM	ADDVEC	VECTOR ADDITION
F222A F4	SMEVAL	EIGENVALUE ROUTINE--REAL SYMMETRIC MATRIX
F223A F4	SMHHTR	TRIDIAGONALIZE REAL SYMMETRIC MATRIX
F224A F4	SMEVEV	EIGENVAL/EIGENVEC ROUT. FOR REAL SYMM. MTRX
F225A F4	PRODHH	CPUTE TRANSFORM TO TRIDIAG. A SYMM. MATRIX
F226A F4	HMEVAL	EIGENVALUE ROUTINE--CMPLX HERMITIAN MTRX
F227A F4	HMHHTR	TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX
F228A F4	HMEVEV	EIGENVAL/EIGENVEC ROUT. FOR HERMITIAN MTRX
F229A F4	PROHHH	CPUTE TRANSFORM TO TRIDIAG. HERMITIAN MTRX
F230A F4	BISECT	CPUTE SUBSET OF EIGENVALS OF TRIDIAG. MTRX
F404A F4	LSS	LINEAR SYSTEM SOLVER
F405A F4	GLSS	GENERAL LINEAR SYSTEM SOLVER
F409A F4	MATFAC	LIN. SYST. SOLVER & MTRX FACTORIZATION(LU)
F410A F4	LSSIT	ITERATIVE SOLUTION OF LINEAR SYSTEMS
F411A F4	BANMAT	BAND MTRX FACTORIZATION & LIN. SYST. SOLVER
F413A CCM	ABTDSS	SYMM. CONSTANT TRIDIAG. LINEAR SYST. SOLVER
F414A F4	SPERLSS	SYMMETRIC PERIODIC LINEAR SYSTEM SOLVER
F415A F4	ECSGLSS	ECS GENERAL LINEAR SYSTEM SOLVER
F416A F4	CATFAC	COMPLEX LINEAR SYSTEM SOLVER
F417A F4	CLSIT	SOLN OF CMPLX LIN. SYST. BY ITERATIVE RFNMT
F418A CCM	FACTTD	LU DECOMP. OF DIAG. DOM. TRIDIAG. MATRIX
F419A CCM	SOLTDM	SOLVE DIAG. DOMINANT TRIDIAG. LINEAR SYSTEM
G601A F4	SPCTRL	SPECTRAL ANALYSIS OF TIME SERIES
G602A F4	ACFCN	AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G603A F4	WINDOW	LAG-WINDOW GENERATOR
G604A F4	PWRSPCT	POWER SPECTRUM COMPUTATION
I401A F4	LOAD	LOAD FORTRAN IV FORMAT FREE INPUT
J506A CCM	ADV	ADVANCE FILM
J510A F4	ASCL	AUTOMATIC GRAPH SCALING
J516A CCM	PLT	PLOT A POINT
J517A CCM	DRV	DRAW VECTOR
J518A CCM	GXA	GENERATE X OR Y AXIS
J520A CCM	TSP	TYPE SPECIFIC POINT
J521A CCM	TCP	TYPE CURRENT POINT
J522A CCM	TSPV	TYPE SPECIFIED POINT VERTICALLY
J523A CCM	FRAME	DRAW FRAME
J524A CCM	STB	STORE WORD IN BUFFER
J526A F4	CONVRT	CONVERT TO 4020 COORDINATE
J527A F4	TCR	TEST COORDINATE FOR RANGE
J528A CCM	DGA	DEFINE GRAPH AREA
J529A F4	DLNLN	DRAW LINEAR-LINEAR GRID
J530A F4	DLNLG	DRAW COMBINATION OF LINEAR & LOG GRIDS
J533A F4	SLLIN	SCALE LEFT SIDE LINEARLY
J535A F4	SBLIN	SCALE TOP OR BOTTOM OF GRAPH LINEARLY
J540A F4	SBLOG	SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY

3. DESCRIPTION OF PROBLEM OR FUNCTION (CONTINUED)

J541A	F4	PLOT	PLOT N POINTS
J542A	CCM	WLCH	WRITE LARGE CHARACTERS HORIZONT. OR VERT.
J562A	F4	PLOJB	STANDARDIZED PLOT ON FILM
J565A	CCM	BS4020	DOUBLE BUFFER FILM OUTPUT
J567A	F4	DLCH	DRAW LARGE CHARACTERS
J569A	F4	COLOR	COLOR
J592A	F4,COM	PICTURE	PICT-PERSPEC PLOTS, HIDN LINES REMVD, COLOR
K203A	CCM	ECR	ECR READS ONE WORD FROM ECS
K204A	COM	ECW	ECW WRITES ONE WORD TO ECS
M101A	F4	SORT1	EXTENDED SORT ROUTINE
M117A	F4	SORT2	TWO LEVEL EXTENDED SORT ROUTINE
M118A	F4	SEARCH	RAPID SEARCH OF A FLOATING POINT TABLE
M119A	F4,COM	ESEARCH	BINARY SEARCH THROUGH EXTENDED CORE STORAGE
M401A	CCM	SHIFT	SHIFT WORD W/O ZERO END AROUND OR SIGN EXT.
M403A	CCM	PUTFTCH	PUTS & FETCHES CHARACTERS
N103A	F4	LABRT	LOS ALAMOS ABORTER & MESSAGE PRINTER
Q408A	CCM	RWPRU	READ/WRITE BINARY PRU (PHYSICAL RECORD)
Q409A	F4	ECSBUFD	DATA TRANSFER FROM ECS TO FILE & VICE VERSA
W113A	CCM	OPEN	OPEN & CLOSE FILES

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THIS PACKAGE INCLUDES REVISIONS AND LATER VERSIONS OF ROUTINES INCLUDED IN THE ALO-COSMIC COLLECTION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED MAY 1974.
CDC6600 VERSION SUBMITTED AUGUST 1973, REPLACED BY VERSION B MARCH 1975.

10. REFERENCES - LOS ALAMOS SCIENTIFIC LABORATORY PROGRAMMER'S INFORMATION MANUAL, VOLUME 2, PROGRAM LIBRARY ABSTRACTS AND USAGE, FEBRUARY 1973, WITH REVISIONS THROUGH SEPTEMBER 1974.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND COMPASS EACH INDICATED BY F4 AND CCM IN THE IDENTIFICATION GIVEN IN ITEM 3 ABOVE.

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE 3.1.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - ROUTINE M401A IS CURRENTLY BEING REVISED. IT IS NOT INCLUDED IN THIS PACKAGE BUT WILL BE AVAILABLE AT A LATER DATE.

15. NAME AND ESTABLISHMENT OF AUTHOR -
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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (10,139 CARDS)
SUBROUTINE DESCRIPTIONS

17. CATEGORY - P
KEYWORDS - FLOATING-POINT ARITHMETIC, ELEMENTARY FUNCTIONS, SPECIAL FUNCTIONS, POLYNOMIALS, INTERPOLATION, MATRICES, SIMULTANEOUS LINEAR EQUATIONS, EIGENSYSTEMS, GRAPHS, INPUT DATA, OUTPUT DATA, UTILITY ROUTINES

1. NAME OR DESIGNATION OF PROGRAM - REBUS2

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - REBUS WAS DEVELOPED TO PERFORM FUEL CYCLE ANALYSIS OF LMFBR REACTORS. GIVEN ONE OR MORE SPECIFIED FUEL SUPPLIES FROM OUTSIDE THE SYSTEM, WITH OR WITHOUT FUEL RECYCLE, REBUS2 COMPUTES THE EQUILIBRIUM OPERATING CONDITIONS OF A FAST REACTOR WITH OR WITHOUT BURN TIME ADJUSTMENT TO A GIVEN DISCHARGE BURNUP, WITH OR WITHOUT FRESH CHARGE ENRICHMENT ADJUSTMENT TO MAINTAIN CRITICALITY, AND WITH OR WITHOUT CONTROL ADJUSTMENT AT EACH FLUX TIME NODE. THE NON-EQUILIBRIUM PROBLEM IS ALSO HANDLED, ALTHOUGH FUEL RECYCLE IS NOT ALLOWED.

4. METHOD OF SOLUTION - THE NUMERICAL METHOD EMPLOYS DIFFUSION THEORY NEUTRONICS SOLUTIONS AS USED IN THE CODES DIF2D AND D2DSCH (ANL-7716).

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - FUEL RECYCLE IS NOT ALLOWED FOR NON-EQUILIBRIUM PROBLEMS. ONLY TWO-DIMENSIONAL PROBLEMS ARE HANDLED.

6. TYPICAL RUNNING TIME - 3 TO 20 MINUTES ARE REQUIRED ON THE IBM 360/195 DEPENDING ON THE SIZE OF THE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - REBUS2 WILL HANDLE BOTH EQUILIBRIUM AND NON-EQUILIBRIUM PROBLEMS USING A NUMBER OF CORE GEOMETRIES INCLUDING HEXAGONAL MESH. THE PROGRAM HAS AN AUTOMATIC RESTART CAPABILITY.

8. RELATED AND AUXILIARY PROGRAMS - THIS IS A STAND-ALONE VERSION OF THE ARC SYSTEM FUEL CYCLE ANALYSIS CODE REBUS2. IT UTILIZES THE ARC SYSTEM TWO-DIMENSIONAL DIFFUSION THEORY CAPABILITY, AN IMPROVED VERSION OF THE CROSS SECTION HOMOGENIZATION CODE NUC001, THE NEUTRONIC INPUT PROCESSOR, NUI002, AND THE HEXAGONAL MESH INPUT PROCESSOR, NUI004.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
IBM360 VERSION SUBMITTED APRIL 1974, REPLACED BY REVISED EDITION NOVEMBER 1974, SAMPLE PROBLEM EXECUTED BY ACC ON IBM370/195.

10. REFERENCES - A. P. OLSON, A USER'S MANUAL FOR THE REACTOR BURNUP SYSTEM, REBUS-2, FRA-TM-62, MARCH 1974.
R. P. HOSTENY AND A. P. OLSON, AN IBM/360 STAND-ALONE VERSION OF REBUS-2, SUPPLEMENT TO FRA-TM-62, 1974.
R. P. HOSTENY, DESCRIPTION AND EDIT OF CROSS SECTION LIBRARIES USED BY REBUS2, ANL-APPLIED PHYSICS NOTE, JANUARY 6, 1975.
#634 REBUS2 LIST OF SUBROUTINES AND OVERLAY STRUCTURE, JANUARY 1975.

10. REFERENCES (CONTINUED)

T. A. DALY, G. K. LEAF, AND A. S. KENNEDY, THE ARC SYSTEM TWO-DIMENSIONAL THEORY CAPABILITY, DARC2D, ANL-7716, MAY 1972.

L. C. JUST, F. HENRYSON, II, A. S. KENNEDY, S. D. SPARCK, R. J. TOPPEL, AND P. M. WALKER, THE SYSTEM ASPECTS AND INTERFACE DATA SETS OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM, ANL-7711, APRIL 1971.

E. A. KOVALSKY, J. ZAPATKA, F. HENRYSON, II, J. HOOVER, AND P. M. WALKER, THE ARC SYSTEM CROSS-SECTION HOMOGENIZATION AND MODIFICATION CAPABILITIES, ANL-7714, JUNE 1971.

J. HOOVER, G. K. LEAF, D. A. MENELEY, AND P. M. WALKER, THE FUEL CYCLE ANALYSIS SYSTEM, REBUS, NUCLEAR SCIENCE AND ENGINEERING, VOL. 45, P. 52, 1971.

11. MACHINE REQUIREMENTS - AT LEAST 400K CORE STORAGE (620K FOR THE SUPPLIED SAMPLE PROBLEM)

12. PROGRAMMING LANGUAGES USED - FORTRAN IV (99.9%) AND ASSEMBLY LANGUAGE (0.1%)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - CREATION OF A LOAD MODULE REQUIRES A TOTAL OF APPROXIMATELY 8.6M BYTES OF DIRECT-ACCESS STORAGE.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL FOR 360 USERS:

SOURCE DECK (3330 PDS REBSRC 4845 BLOCKS)
OBJECT MODULE (3330 PDS REBOBJ 3588 BLOCKS)
LOAD MODULE (3330 PDS REBMOD 1745 BLOCKS)
SAMPLE PROBLEM (613 CARDS)
CONTROL INFORMATION (JCL 147 CARDS)

16. MATERIAL AVAILABLE (CONTINUED)
LIBRARIES (XSISO1 1 BLOCK, 6447 BYTES, XSISO2 1 BLOCK, 6447 BYTES)
REFERENCE REPORT, FRA-TM-62, AND SUPPLEMENT
REFERENCE REPORTS ANL-7711, ANL-7714, AND ANL-7716 ARE AVAILABLE AS MICROFICHE COPIES UPON REQUEST
FOR NON-360 USERS:
SOURCE DECK (47,160 CARDS)
CONTROL INFORMATION (147 OVERLAY CARDS)
SAMPLE PROBLEM (613 CARDS)
REFERENCE REPORTS AS FOR 360 USERS PLUS APPLIED PHYSICS NOTE AND LIST OF SUBROUTINES AND OVERLAY STRUCTURE

17. CATEGORY - D
KEYWORDS - 2-DIMENSIONAL, BREEDING, CRITICALITY, DEPLETION, LMFBR REACTORS, FUEL CYCLE

1. NAME OR DESIGNATION OF PROGRAM - SLACMON

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - SLACMON, OPERATING AS A SYSTEM'S TASK OR JOB UNDER OS/360 MVT, IS DESIGNED TO MONITOR HARDWARE AND SOFTWARE PERFORMANCE OVER A GIVEN PERIOD OF TIME. INPUT TO SLACMON IS THE PARAMETER FIELD ON THE EXECUTE CARD COUPLED WITH THE CORRESPONDING OPERAND IN THE OPERATOR'S START COMMAND TO ALLOW SELECTED FUNCTIONS TO BE PERFORMED. FIVE DATA SETS OPTIONALLY PROVIDE NAMES OF QUEUES, I/O DEVICES, OR MODULES THAT SLACMON WILL MONITOR. OUTPUT CONSISTS OF UP TO 12 REPORTS FOLLOWED BY A SUMMARY PAGE; CERTAIN SUMMARY DATA MAY APPEAR ON THE CONSOLE DEVICE. THE OUTPUT IS MOST USEFUL FOR IDENTIFYING BOTTLENECKS AND INTERACTIONS, TUNING A SYSTEM FOR PEAK PERFORMANCE AND FOR INDICATING DESIRABLE HARDWARE AND SOFTWARE RECONFIGURATION.

4. METHOD OF SOLUTION - MONITORING IS PERFORMED BY COUNTING VARIOUS EVENTS (SVC CALLS, I/O INTERRUPTS) AND BY SAMPLING OTHERS (THE CHANGING OF CONTROL BLOCKS). BECAUSE AS THE NUMBER OF SAMPLES INCREASES THE SAMPLING RESULTS BECOME MORE ACCURATE, USE OF THIS SAMPLING TECHNIQUE MAKES IT POSSIBLE TO OBTAIN A SIGNIFICANT AMOUNT OF PERFORMANCE DATA WITH VERY LITTLE ADDITIONAL SYSTEMS OVERHEAD.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MEANINGFUL REPORTS ARE PREPARED FOR THE DISKS, DRUMS, TAPES, PRINTERS AND READERS IN USE AT THE TIME (1969) THE PROGRAM WAS DEVELOPED. STATISTICS ON NEWER DEVICES SUCH AS BLOCK MULTIPLEXER CHANNELS, RPS FACILITIES, MAY NOT BE MEANINGFUL.

6. TYPICAL RUNNING TIME - SLACMON MAY BE RUN FOR A GIVEN AMOUNT OF TIME OR INDEFINITELY UNTIL STOPPED.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THIS IS VERSION 2.2 OF THE EARLIER SLACMON VERSION 1.2, ALSO KNOWN AS SUPERMON. IT CONTAINS TWO NEW FUNCTIONS -
   (1) THE ABILITY TO RUN IN AN MFT (WITH SUBTASKING) SYSTEM, AND
   (2) THE MEASUREMENT OF CERTAIN SYSTEM QUEUE AREA STATISTICS.
   THESE CHANGES ARE CONTRIBUTIONS FROM THE BANK OF MONTREAL.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JANUARY 1975.
   IBM360 VERSION SUBMITTED NOVEMBER 1974.

10. REFERENCE - G. T. SCHARF, SLACMON VERSION 2.2, SLAC MVT SOFTWARE MONITOR, STANFORD CENTER FOR INFORMATION PROCESSING PUBLICATION, SEPTEMBER 1, 1973.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 MVT OR MFT.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - SLAOMON CONSISTS OF THREE SEPARATE MODULES WHOSE STRUCTURE AND FUNCTIONS ARE OFTEN HIGHLY-DEPENDENT UPON VARIOUS SERVICES PROVIDED BY THE OS SUPERVISOR. MULTITASKING IS USED TO OBTAIN WAIT TIME AND TO PERFORM THE SAMPLING TECHNIQUE. THUS, THE PROGRAM MUST BE RUN UNDER MVT OR MFT WITH SUBTASKING.

15. NAME AND ESTABLISHMENT OF AUTHORS -

AUTHORS: V. ANDROSCIANI, G. MINSHALL,
R. LONERGAN, AND G. T. SCHARF

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STANFORD LINEAR ACCELERATOR CENTER
STANFORD UNIVERSITY
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STANFORD, CALIFORNIA 94305

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (6677 CARDS)
CONTROL INFORMATION (JCL 336 CARDS)
REFERENCE REPORT

17. CATEGORY - P
KEYWORDS - PERFORMANCE EVALUATION, SYSTEM CONFIGURATION

ACC ABSTRACT 636 04/75

1. NAME OR DESIGNATION OF PROGRAM - 6KILER

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - 6KILER WAS DEVELOPED FOR PREDICTIVE AND POST-TEST ANALYSES OF CORE HEAT TRANSFER DURING A LOSS-OF-COOLANT ACCIDENT FOR A GENERAL ELECTRIC BWR/6 TYPE NUCLEAR REACTOR PLANT.

4. METHOD OF SOLUTION - A PSEUDO-TWO-DIMENSIONAL MODEL IN WHICH RADIATION AND CONDUCTION IN THE AXIAL DIRECTION ARE ASSUMED TO BE NEGLIGIBLE IS USED. THE MODEL TREATS INTERCHANGE OF THERMAL RADIATION AMONG SURFACES USING THE NETWORK METHOD OF SPARROW AND CESS. HEAT CONDUCTION IN THE FUEL RODS IS COMPUTED BY NUMERICAL INTEGRATION OF THE ONE-DIMENSIONAL FOURIER HEAT CONDUCTION EQUATION ASSUMING THE TEMPERATURE IS INDEPENDENT OF AXIAL AND ANGULAR POSITION AND THE HEAT GENERATION IN THE HEATED REGIONS IS INDEPENDENT OF POSITION AND TEMPERATURE. TIME-DEPENDENT DECAY HEAT SOURCES ARE CALCULATED BY LINEAR INTERPOLATION FROM A TABLE OF VALUES. THE ZIRCONIUM-STEAM REACTION RATE FOLLOWS THE PARABOLIC RATE LAW. CONVECTION HEAT TRANSFER COEFFICIENTS ARE SUPPLIED BY THE USER.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE PROGRAM APPLIES ONLY TO THE GEOMETRY AND MATERIALS OF THE GENERAL ELECTRIC BWR/6 REACTOR CORE.

6. TYPICAL RUNNING TIME - 2 MINUTES ARE REQUIRED TO COMPILE THE PROGRAM AND EXECUTE THE SAMPLE PROBLEM ON AN IBM370/195.

7. UNUSUAL FEATURES OF THE PROGRAM - THIS PROGRAM IS SPECIALIZED TO THE ANALYSIS OF HEAT TRANSFER IN THE GENERAL ELECTRIC BWR/6 TYPE PLANT. HOWEVER, IT IS COMPOSED OF MODULAR SUBROUTINES, EACH WITH A DISTINCT FUNCTION, SUCH AS COMPUTING RADIANT HEAT TRANSFER. SUCH SUBROUTINES MAY BE ADAPTABLE FOR USE IN SOLVING A WIDER RANGE OF PROBLEMS. 6KILER MAINTAINS THE SAME ONE-DIMENSIONAL HEAT CONDUCTION SOLUTION TECHNIQUE FOR THE FUEL PINS AND UTILIZES THE SAME TECHNIQUES AS THE MOXY CODE. HOWEVER, 6KILER GENERATES ITS OWN VIEWFACTOR MATRIX INTERNAL TO THE CODE BASED ON AN 8 X 8 ARRAY OF FUEL RODS, MODIFIES THE RADIATION HEAT TRANSFER MATRIX EACH TIME AN EMISSIVITY CHANGE OCCURS ON FUEL RODS, WATER ROD, OR CANISTER, AND CONSIDERS ROD NUMBER 37, WHICH IS DESIGNATED THE "WATER ROD", TO BE A PASSIVE ELEMENT.

8. RELATED AND AUXILIARY PROGRAMS - MOXY/MOD1 (ACC ABSTRACT 551) IS A PREDECESSOR OF 6KILER.

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1974.
IBM360 VERSION SUBMITTED APRIL 1974, SAMPLE PROBLEM EXECUTED BY ACC ON IBM370/195, JUNE 1974.

10. REFERENCES - R. W. GRIEBE, K. D. RICHERT, M. E. RADD, AND C. M. MOSER, 6KILER, VER 001, A DIGITAL COMPUTER CODE FOR BWR/6 CORE HEAT TRANSFER ANALYSIS, EI 74-5, FEBRUARY 1974.
6KILER ORGANIZATION OF THE CODE AND CODE INPUT, EI MEMORANDUM, APRIL 1974.

11. MACHINE REQUIREMENTS - 240K BYTES OF CORE TO COMPILE, 210K BYTES TO EXECUTE

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND BAL

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
R. W. GRIEBE, K. D. RICHERT, M. E. RADD,
AND C. M. MOSER
ENERGY INCORPORATED
P. O. BOX 736
IDAHO FALLS, IDAHO 84501

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (1287 CARDS)
SAMPLE PROBLEM (52 CARDS)
CONTROL INFORMATION (JCL 81 CARDS)
SAMPLE PROBLEM OUTPUT (49 SELECTED PAGES)
REFERENCE REPORT AND MEMORANDUM

17. CATEGORY - H
KEYWORDS - HEAT TRANSFER, BWR/6 REACTORS, FUEL ELEMENTS, ZIRCALOY, LOCA, MOXY/MOD1 CODES

ACC ABSTRACT 637 03/75

1. NAME OR DESIGNATION OF PROGRAM - GAMTAB

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THIS PACKAGE CONTAINS A TWO-PART CATALOG OF GAMMA RAYS EMITTED BY NUCLIDES IN RADIOACTIVE DECAY AND A LIST OF CORRESPONDING REFERENCES. THE FIRST PART LISTS THE GAMMA RAYS IN ORDER OF ASCENDING ENERGY. THIS LISTING CONSISTS OF GAMMA-RAY ENERGY AND UNCERTAINTY, ABUNDANCE, HALF-LIFE, PRODUCTION MODE, AND THE ENERGIES OF TWO OF THE MORE ABUNDANT ASSOCIATED GAMMA RAYS. THE SECOND PART OF THE CATALOG LISTS UP TO 50 OF THE MORE ABUNDANT GAMMA RAYS FOR EACH NUCLIDE. THE LISTING FOR EACH NUCLIDE INCLUDES HALF-LIFE, PRODUCTION MODE, POSSIBLE GENETIC RELATIONSHIPS, AND REFERENCES. THIS LISTING IS FOLLOWED BY THE ENERGY, UNCERTAINTY IN ENERGY, AND ABUNDANCE OF EACH GAMMA RAY. REFERENCES AVAILABLE THROUGH MAY 1973 CORRESPONDING TO THE REFERENCE KEYS LISTED FOR EACH NUCLIDE IN PART 2 ARE LISTED AS THE THIRD FILE.

4. METHOD OF SOLUTION - THE GAMMA RAY DATA IS ARRANGED IN INCREASING ENERGY IN PART 1 AND IN ASCENDING MASS NUMBER OF THE NUCLIDE IN PART 2.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED JUNE 1974.
IBM360 VERSION SUBMITTED MAY 1974, CORRECTED TO VERSION B JANUARY 1975.

10. REFERENCES - W. W. BOWMAN AND K. W. MACMURDO, RADIOACTIVE DECAY GAMMAS ORDERED BY ENERGY AND NUCLIDE, ATOMIC DATA AND NUCLEAR DATA TABLES, VOL. 13, NO. 2-3, FEBRUARY 1974.
W. W. BOWMAN AND K. W. MACMURDO, RADIOACTIVE-DECAY GAMMAS, SAVANNAH RIVER LABORATORY MEMORANDUM, MAY 1974.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED -

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED -

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -
W. W. BOWMAN AND K. W. MACMURDO

15. NAME AND ESTABLISHMENT OF AUTHOR(S) (CONTINUED)
E. I. DUPONT DE NEMOURS & CO.
SAVANNAH RIVER LABORATORY
AIKEN, SOUTH CAROLINA 29801

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL*
ENERGY DATA (FILE 1 19,416 CARDS)
NUCLIDE DATA (FILE 2 6905 CARDS)
REFERENCES (FILE 3 550 CARDS)
REFERENCE MEMORANDUM
* 2 TAPES IF CARD IMAGE RECORDS, 1 TAPE BLOCKED

17. CATEGORY - Z
KEYWORDS - GAMMA RADIATION, RADIOACTIVITY, ISOTOPES

1. NAME OR DESIGNATION OF PROGRAM - RIGEL4,CHECK4,SUMUP4,LISTF4, PLOTF4,RESEND,CRECT,DICT4,CAREN4

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - CDC6600

3. DESCRIPTION OF PROBLEM OR FUNCTION - THESE PROGRAMS ARE UPDATED VERSIONS OF ENDF/B CHECKING, RETRIEVAL, AND DISPLAY CODES CAPABLE OF PROCESSING THE VERSION-IV DATA FILES.
   RIGEL4 RETRIEVES ENDF/B DATA AND CHANGES MODE (BCD-BIN) OR ARRANGEMENT. UPDATED VERSION PROCESSES DECAY DATA (MF=1, MT=457) AND ERROR FILES.
   CHECK4 CHECKS THE STRUCTURE, CONSISTENCY, AND FORMATS OF ENDF DATA FILES. UPDATED VERSION RECOGNIZES NEWLY DEFINED MT AND MF NUMBERS, CHECKS MT=457 AND THE FORMATS OF THE ERROR FILES, CONTAINS RSIC PHOTON FILE CHANGES.
   SUMUP4 CHECKS WHETHER PARTIAL CROSS SECTIONS ADD UP TO THE TOTAL. UPDATED VERSION FLAGS GRID POINTS PRESENT IN THE PARTIAL CROSS SECTION, ABSENT IN THE TOTAL.
   LISTF4 PRODUCES INTERPRETED LISTINGS OF ENDF/B DATA. UPDATED VERSION LISTS MT=457, SKIPS OVER ERROR FILES, CONTAINS MINOR CORRECTIONS.
   PLOTF4 PRODUCES PLOTS OF ENDF/B DATA. UPDATED VERSION PLOTS MT=457, SKIPS OVER ERROR FILES, CONTAINS MINOR CORRECTIONS.
   RESEND PROCESSES ENDF MATERIALS WITH RESONANCE PARAMETERS INTO A POINTWISE FORM. CAPABILITY OF PROCESSING ADLER-ADLER PARAMETERS ADDED.
   CRECT CORRECTS ENDF/B DATA FILES.
   DICT4 GENERATES A SECTION TABLE OF CONTENTS (DICTIONARY) FOR ENDF/B MATERIALS.
   CAREN4 TESTS FOR DISCONTINUITIES ACROSS THE LIMITS OF RESONANCE RANGES OF AN ENDF/B MATERIAL. UPDATED VERSION CONTAINS MINOR CORRECTIONS.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM -

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
   CDC6600 VERSION SUBMITTED MAY 1974, REPLACED BY REVISED EDITION OCTOBER 1974.

10. REFERENCES - NATIONAL NEUTRON CROSS SECTION CENTER, DESCRIPTION OF THE ENDF/B PROCESSING CODES AND RETRIEVAL SUBROUTINES, BNL-50300 (ENDF-110), SEPTEMBER 1967, REVISED APRIL 1969, REVISED APRIL 1970, REVISED JUNE 1971.

10. REFERENCES (CONTINUED)

H. C. HONECK, SPECIFICATIONS FOR AN EVALUATED NUCLEAR DATA FILE FOR REACTOR APPLICATIONS, BNL-50066, MAY 1966, REVISED JULY 1967.

M. K. DRAKE, DATA FORMAT AND PROCEDURES FOR THE ENDF NEUTRON CROSS SECTION LIBRARY, BNL-50274, OCTOBER 1970.

O. OZER AND B. SAPIENZA, DISTRIBUTION OF ENDF/B CHECKING, RETRIEVAL AND DISPLAY CODES, BNL MEMORANDUM, APRIL 8, 1974.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - SCOPE.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

NATIONAL NEUTRON CROSS SECTION CENTER
BROOKHAVEN NATIONAL LABORATORY
UPTON, LONG ISLAND, NEW YORK 11973

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (RIGEL4 2174 CARDS, CHECK4 3707 CARDS, SUMUP4 575 CARDS, LISTF4 3413 CARDS, PLOTF4 4802 CARDS, RESEND 2504 CARDS, CPECT 259 CARDS, DICT4 203 CARDS, CAREN4 1529 CARDS)
REFERENCE REPORT, BNL-50300, AND MEMORANDUM

17. CATEGORY - M
KEYWORDS - DATA PROCESSING, CROSS SECTIONS, GRAPHS, INPUT DATA, LIBRARIES, MAINTENANCE, RETRIEVAL

1. NAME OR DESIGNATION OF PROGRAM - POLLA

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE PROGRAM TRANSFORMS A SET OF R-MATRIX NUCLEAR RESONANCE PARAMETERS INTO A SET OF EQUIVALENT S-MATRIX (OR KAPUR-PEIERLS) RESONANCE PARAMETERS.

4. METHOD OF SOLUTION - THE PROGRAM UTILIZES THE MULTILEVEL FORMALISM OF REICH AND MOORE AND AVOIDS DIAGONALIZATION OF THE LEVEL MATRIX. THE PARAMETERS ARE OBTAINED BY A DIRECT PARTIAL FRACTION EXPANSION OF THE REICH-MOORE EXPRESSION OF THE COLLISION MATRIX. THIS APPROACH APPEARS SIMPLER AND FASTER WHEN THE NUMBER OF FISSION CHANNELS IS KNOWN AND SMALL. THE METHOD IS PARTICULARLY USEFUL WHEN A LARGE NUMBER OF LEVELS MUST BE CONSIDERED BECAUSE IT DOES NOT REQUIRE DIAGONALIZATION OF A LARGE LEVEL MATRIX.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - BY DIMENSION STATEMENTS, THE PROGRAM IS LIMITED TO MAXIMA OF 100 LEVELS AND 5 CHANNELS.

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM REQUIRES LESS THAN ONE MINUTE ON THE IBM360/91.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED NOVEMBER 1974.
IBM360 VERSION SUBMITTED AUGUST 1974, SAMPLE PROBLEM EXECUTED BY ACC OCTOBER 1974 ON IBM370/195.

10. REFERENCES - G. DE SAUSSURE AND R. B. PEREZ, POLLA, A FORTRAN PROGRAM TO CONVERT R-MATRIX-TYPE MULTILEVEL RESONANCE PARAMETERS FOR FISSILE NUCLEI INTO EQUIVALENT KAPUR-PEIERLS-TYPE PARAMETERS, ORNL-TM-2599, JUNE 1969.

11. MACHINE REQUIREMENTS - THE PROGRAM REQUIRES 240K BYTES TO COMPILE, 62K BYTES TO EXECUTE.

12. PROGRAMMING LANGUAGE(S) USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE RUNNING TIME INCREASES AS THE RATIO OF AVERAGE WIDTH TO SPACING INCREASES.

15. NAME AND ESTABLISHMENT OF AUTHORS -

G. DE SAUSSURE AND R. B. PEREZ
HOLIFIELD NATIONAL LABORATORY
P. O. BOX X
OAK RIDGE, TENNESSEE 37830

16. MATERIAL AVAILABLE -
SOURCE DECK (232 CARDS)
SAMPLE PROBLEM (107 CARDS)
SAMPLE PROBLEM OUTPUT (4 PAGES)
REFERENCE REPORT

17. CATEGORY - A
KEYWORDS - RESONANCE PARAMETERS, R-MATRIX, KAPUR-PEIERLS, FORMALISM

ACC ABSTRACT 640 03/75

1. NAME OR DESIGNATION OF PROGRAM - DE/STEP,INTRP

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360, CDC6000-7000 (SEE ITEM 14)

3. DESCRIPTION OF PROBLEM OR FUNCTION - DE/STEP,INTRP PERFORMS THE SOLUTION OF AN INITIAL VALUE PROBLEM FOR A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS.

4. METHOD OF SOLUTION - THE NUMERICAL ALGORITHM IS A VARIABLE-ORDER, VARIABLE-STEP ADAMS METHOD WHICH USES A MODIFIED DIVIDED DIFFERENCE REPRESENTATION OF THE PECE FORMULAS AND LOCAL EXTRAPOLATION. (PECE STANDS FOR PREDICT-EVALUATE-CORRECT-EVALUATE). FOUR CODES ARE PROVIDED: THE CORE INTEGRATOR STEP WHICH ADVANCES THE NUMERICAL SOLUTION OF AN EQUATION ONE STEP, AN INTERPOLATION ROUTINE INTRP TO INTERPOLATE THE SOLUTION AND ITS DERIVATIVE AT OUTPUT POINTS, A DRIVER DE WHICH SIMPLIFIES USING THE OTHER CODES FOR ROUTINE PROBLEMS, AND A SUBROUTINE MACHIN FOR CALCULATING THE UNIT ROUNDOFF OF THE MACHINE BEING USED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE BASIC VERSION IS LIMITED TO THE INTEGRATION OF A MAXIMUM OF 20 EQUATIONS, BUT THE LIMIT CAN BE CHANGED EASILY. THE EXTENDED VERSION USES VARIABLE DIMENSIONING AND HAS NO FIXED LIMIT.

6. TYPICAL RUNNING TIME - LESS THAN 1 MINUTE IS REQUIRED TO COMPILE AND EXECUTE THE SAMPLE PROBLEM.

7. UNUSUAL FEATURES OF THE PROGRAM - THE CODES EMPHASIZE EFFICIENCY IN TERMS OF FUNCTION EVALUATIONS, FLEXIBILITY IN THE INTEGRATION, AND EASE OF USE. THEY DETECT AND DEAL WITH DISCONTINUITIES AND MODERATE STIFFNESS, WARN THE USER OF SEVERE STIFFNESS, DETECT REQUESTS FOR TOO MUCH ACCURACY AND ARE ESSENTIALLY INDEPENDENT OF THE NUMBER AND PLACEMENT OF OUTPUT POINTS. THE CODES ARE WRITTEN IN SINGLE-PRECISION; INSTRUCTIONS FOR CONVERTING THEM TO DOUBLE-PRECISION ARE INCLUDED IN THE REFERENCE REPORT.

8. RELATED AND AUXILIARY PROGRAMS - SUBROUTINE MACHIN, USED TO DETERMINE THE MACHINE-DEPENDENT ROUNDOFF ERROR, IS INCLUDED.

9. STATUS - ABSTRACT FIRST DISTRIBUTED AUGUST 1974.
AUTHOR'S VERSION SUBMITTED MAY 1974, SAMPLE PROBLEM EXECUTED ON IBM370/195 AND ON CDC7600 BY ACC JULY 1974.

10. REFERENCES - L. F. SHAMPINE AND M. K. GORDON, USING DE/STEP,INTRP TO SOLVE ORDINARY DIFFERENTIAL EQUATIONS, REPORT, JULY 1974.
L. F. SHAMPINE AND M. K. GORDON, COMPUTER SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: THE INITIAL VALUE PROBLEM, W. H. FREEMAN AND COMPANY, SAN FRANCISCO, (IN PRESS).
DE/STEP,INTRP, ACC NO. 640.6600, ACC PROGRAMMING NOTE 75-8, NOVEMBER 19, 1974.

10. REFERENCES (CONTINUED)
DF/STEP,INTRP, ACC NO. 640.360, ACC PROGRAMMING NOTE 75-9, NOVEMBER 19, 1974.

11. MACHINE REQUIREMENTS - FOR EXECUTION OF THE BASIC VERSION: 44K BYTES (IBM360), 12000 (OCTAL) WORDS (CDC6600).

12. PROGRAMMING LANGUAGE USED - ANSI STANDARD FORTRAN

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360 (IBM360), SCOPE 3.3 (CDC6600).

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE PROGRAMS ARE EXPECTED TO BE MACHINE-INDEPENDENT. HOWEVER, SUBROUTINES DE AND STEP STORE SEVERAL VARIABLES INTERNALLY BETWEEN CALLS; THIS ABILITY IS NOT GUARANTEED IN STANDARD FORTRAN. THE EXTENDED VERSION DOES NOT ASSUME INTERNAL STORAGE, BUT IT IS UNACCEPTABLE TO THE WATFOR COMPILER (AND POSSIBLY TO OTHERS).

15. NAME AND ESTABLISHMENT OF AUTHORS -
L. F. SHAMPINE AND M. K. GORDON
SANDIA LABORATORIES
P. O. BOX 5800
ALBUQUERQUE, NEW MEXICO 87115

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (360-1579 CARDS, 6600-1579 CARDS)
SAMPLE PROBLEMS (360-58 CARDS, 6600-60 CARDS)
AUXILIARY PROGRAMS (360-24 CARDS, 6600-25 CARDS)
SAMPLE PROBLEM OUTPUT (1 PAGE)
REFERENCE REPORT AND ACC NOTES

17. CATEGORY - P
KEYWORDS - DIFFERENTIAL EQUATIONS, NUMERICAL CALCULATIONS, PREDICTOR-CORRECTOR, ADAMS METHODS, INITIAL-VALUE PROBLEMS

1. NAME OR DESIGNATION OF PROGRAM - SAP4

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - SAP4 IS A STRUCTURAL ANALYSIS PROGRAM FOR DETERMINING THE STATIC AND DYNAMIC RESPONSE OF LINEAR SYSTEMS. THE STRUCTURAL SYSTEMS TO BE ANALYZED MAY BE COMPOSED OF COMBINATIONS OF A NUMBER OF DIFFERENT STRUCTURAL ELEMENTS. PRESENTLY, THE PROGRAM CONTAINS THE FOLLOWING ELEMENT TYPES -
   (A) THREE-DIMENSIONAL TRUSS ELEMENT,
   (B) THREE-DIMENSIONAL BEAM ELEMENT,
   (C) PLANE STRESS AND PLANE STRAIN ELEMENT,
   (D) TWO-DIMENSIONAL AXISYMMETRIC SOLID,
   (E) THREE-DIMENSIONAL SOLID,
   (F) VARIABLE-NUMBER-NODES THICK SHELL AND THREE-DIMENSIONAL ELEMENT,
   (G) THIN PLATE OR THIN SHELL ELEMENT,
   (H) BOUNDARY ELEMENT, AND
   (I) PIPE ELEMENT (TANGENT AND BEND).

4. METHOD OF SOLUTION - THE FORMATION OF THE STRUCTURE MATRICES IS CARRIED OUT IN THE SAME WAY IN A STATIC OR DYNAMIC ANALYSIS. THE STATIC ANALYSIS IS CONTINUED BY SOLVING THE EQUATIONS OF EQUILIBRIUM FOLLOWED BY THE COMPUTATION OF ELEMENT STRESSES. IN A DYNAMIC ANALYSIS THE CHOICE IS BETWEEN FREQUENCY CALCULATIONS ONLY, FREQUENCY CALCULATIONS FOLLOWED BY RESPONSE HISTORY ANALYSIS, FREQUENCY CALCULATIONS FOLLOWED BY RESPONSE SPECTRUM ANALYSIS, OR RESPONSE HISTORY ANALYSIS BY DIRECT INTEGRATION. TO OBTAIN THE FREQUENCIES AND VIBRATION MODE SHAPES, SOLUTION ROUTINES ARE USED WHICH CALCULATE THE REQUIRED EIGENVALUES AND EIGENVECTORS DIRECTLY WITHOUT A TRANSFORMATION OF THE STRUCTURE STIFFNESS MATRIX AND MASS MATRIX TO A REDUCED FORM. IN THE DIRECT INTEGRATION AN UNCONDITIONALLY STABLE INTEGRATION SCHEME IS USED, WHICH ALSO OPERATES ON THE ORIGINAL STRUCTURE STIFFNESS MATRIX AND MASS MATRIX. IN THIS MANNER THE PROGRAM OPERATION AND NECESSARY INPUT DATA FOR A DYNAMIC ANALYSIS IS A SIMPLE ADDITION TO WHAT IS NEEDED FOR A STATIC ANALYSIS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE CAPACITY OF THE PROGRAM DEPENDS MAINLY ON THE TOTAL NUMBER OF NODAL POINTS IN THE SYSTEM, THE NUMBER OF EIGENVALUES NEEDED IN THE DYNAMIC ANALYSIS AND THE COMPUTER USED. THERE IS PRACTICALLY NO RESTRICTION ON THE NUMBER OF ELEMENTS USED, THE NUMBER OF LOAD CASES OR THE ORDER AND BANDWIDTH OF THE STIFFNESS MATRIX. EACH NODAL POINT IN THE SYSTEM CAN HAVE FROM ZERO TO SIX DISPLACEMENT DEGREES OF FREEDOM. THE ELEMENT STIFFNESS AND MASS MATRICES ARE ASSEMBLED IN CONDENSED FORM. THEREFORE, THE PROGRAM IS EQUALLY EFFICIENT IN THE ANALYSIS OF ONE-, TWO- OR THREE-DIMENSIONAL SYSTEMS.

6. TYPICAL RUNNING TIME - ABOUT 4 MINUTES ARE REQUIRED TO COMPILE THE PROGRAM AND EXECUTE THE SAMPLE PROBLEM ON AN IBM370/195.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - SAP4 IS THE LATEST EDITION OF THE SAP SERIES OF PROGRAMS. EARLIER EDITIONS WERE DESIGNATED SAP2 OR SOLIDSAP AND SAP3. THIS SAP4 EDITION HAS AVAILABLE A NEW VARIABLE-NUMBER-NODES THICK SHELL AND THREE-DIMENSIONAL ELEMENT, AND OUT-OF-CORE DIRECT INTEGRATION FOR TIME HISTORY ANALYSIS. THE ORIGINAL SAP4 PROGRAM, A CDC VERSION, WAS OBTAINED FROM THE EARTHQUAKE ENGINEERING RESEARCH CENTER.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
IBM360 VERSION SUBMITTED OCTOBER 1974, REPLACED BY REVISION B MARCH 1975, SAMPLE PROBLEMS EXECUTED BY ACC ON IBM370/195.

10. REFERENCES - KLAUS-JURGEN BATHE, EDWARD L. WILSON, AND FRED E. PETERSON, SAP IV, A STRUCTURAL ANALYSIS PROGRAM FOR STATIC AND DYNAMIC RESPONSE OF LINEAR SYSTEMS, EERC 73-11, JUNE 1973, REVISED APRIL 1974.

11. MACHINE REQUIREMENTS - 650K BYTES AND 8 DIRECT ACCESS DEVICES BESIDES THE STANDARD I/O UNITS

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360, OS/370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -
STANLEY ZAWADZKI
APPLIED MATHEMATICS DIVISION
ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (13,700 CARDS)
SAMPLE PROBLEMS (359 CARDS)
SAMPLE PROBLEM OUTPUT (75 SELECTED PAGES)
CONTROL INFORMATION (JCL 25 CARDS)
REFERENCE REPORT

17. CATEGORY - I
KEYWORDS - STRUCTURAL ANALYSIS, 3-DIMENSIONAL, BEAMS, SHELLS, PIPES, MASS MATRICES

1. NAME OR DESIGNATION OF PROGRAM - PROGLOOK

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - PROGLOOK MAKES IT POSSIBLE TO MONITOR THE EXECUTION OF VIRTUALLY ANY OS/MVT, OS/MFT, OR VS2 RELEASE 1.6 LOAD MODULE. THE MAIN REASON FOR USING PROGLOOK IS TO FIND OUT WHICH PORTIONS OF A CODE USE MOST OF THE CPU TIME SO THAT THOSE PARTS OF THE PROGRAM CAN BE REWRITTEN TO REDUCE CPU TIME. FOR LARGE PRODUCTION PROGRAMS, USERS HAVE TYPICALLY FOUND IT POSSIBLE TO REDUCE CPU TIME BY 10 TO 30 PERCENT WITHOUT CHANGING THE PROGRAM'S FUNCTION.

4. METHOD OF SOLUTION - PROGLOOK DETERMINES HOW MUCH OF THE TOTAL CPU TIME FOR A RUN IS USED BY EACH PORTION OF THE LOAD MODULE BY ATTACHING THE LOAD MODULE AS A SUBTASK. THE STATUS OF THIS SUBTASK (THE USER'S LOAD MODULE) IS SAMPLED REGULARLY, AND A RECORD OF IT IS WRITTEN ON AN INTERMEDIATE FILE. AFTER THE RUN IS COMPLETED, A POST-PROCESSOR IS INVOKED WHICH SUMMARIZES AND PLOTS THE DATA COLLECTED.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - THE MEASURED TASK CANNOT ATTACH MORE THAN 254 SUBTASKS. IF THE DATA PRODUCED BY PROGTIME EXCEEDS 127 DISTINCT ENTITIES OR 2500 HISTOGRAM CELLS PROGLOOK TERMINATES, PRODUCING NO HISTOGRAMS.

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM - PROGLOOK CAN BE USED TO MONITOR SOMETHING AS SIMPLE AS A FORTRAN MAIN PROGRAM OR AS COMPLEX AS THE PL/1 COMPILER OR HASP.

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED MARCH 1975.
IBM360 VERSION SUBMITTED NOVEMBER 1974.

10. REFERENCE - R. JOHNSON AND T. JOHNSTON, PROGLOOK USERS GUIDE, USER NOTE 33, SC0007, MARCH 1974, REVISION 4.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - PROGLOOK MONITORING OVERHEAD IS ON THE ORDER OF 6 PERCENT. PROGLOOK CONSISTS OF TWO PROGRAMS PROGTIME AND PROGLOOK. PROGTIME IS AN ASSEMBLER LANGUAGE PROGRAM WHICH USES THE INTERVAL TIMER TO

14. ANY OTHER INFORMATION OR RESTRICTIONS (CONTINUED)
CATCH A PICTURE OF ANY PROGRAM RUNNING UNDER IT AND RECORDS THIS INFORMATION IN A DATA SET. PROGLOOK IS A FORTRAN PROGRAM WHICH USES THE DATA SET PRODUCED BY PROGTIME TO CREATE THE SUMMARY REPORTS AND PLOTS.

15. NAME AND ESTABLISHMENT OF AUTHORS -

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STANFORD LINEAR ACCELERATOR CENTER
STANFORD UNIVERSITY
P. O. BOX 4349
STANFORD, CALIFORNIA 94305

* CONTACT

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECKS (PROGLOOK 925 CARDS, PROGTIME (MVT & VS2) 823 CARDS, (MFT) 1079 CARDS)
CONTROL INFORMATION (PROGLOOK 27 CARDS, PROGTIME 22 CARDS)
REFERENCE REPORT

17. CATEGORY - P
KEYWORDS - DATA PROCESSING PERFORMANCE

ACC ABSTRACT 643 04/75

1. NAME OR DESIGNATION OF PROGRAM - NUBOW

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - NUBOW PERFORMS A TWO-DIMENSIONAL ELASTIC ANALYSIS OF REACTOR CORE SYSTEMS SUBJECTED TO THERMAL AND/OR MECHANICAL BOWING. REACTOR ASSEMBLIES ARE CONSIDERED TO BE ELASTIC BEAM MEMBERS WHICH MAY HAVE VARIABLE GEOMETRY. EQUILIBRIUM FORCES AND POSITIONS ARE CALCULATED ALONG WITH THE SHAPES OF INDIVIDUAL ROWS. CLEARANCE AND LOCAL FLEXIBILITY ARE ALLOWED AT ALL CONTACTS.

4. METHOD OF SOLUTION - A RELAXATION PROCEDURE IS USED TO FIND EQUILIBRIUM POSITIONS OF CONTACTING NODES. REACTOR DUCTS ARE MODELED AS ELASTIC BEAMS WITH LOCAL FLEXIBILITY TREATED BY LINEAR SPRINGS. CONTACT FORCES ARE SET TO ZERO FOR NON-INTERACTING NODES. THE RELAXATION PROCEDURE ADJUSTS THE POSITIONS OF NODES, BOTH INDIVIDUALLY AND IN BLOCKS, UNTIL MECHANICAL EQLILIBRIUM IS ACHIEVED TO WITHIN A SPECIFIED ERROR ON FORCES.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - AN AXISYMMETRIC MODEL IS ASSUMED. FRICTION FORCES ARE NOT INCLUDED. POSSIBLE CONTACT IS ALLOWED ONLY AT SPECIFIED AXIAL LOCATIONS ON THE ASSEMBLIES. THE PROGRAM CURRENTLY IS DIMENSIONED FOR MAXIMA OF 16 ROWS OF BEAMS AND 25 NODES PER BEAM.

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM, CONSISTING OF TWO COMPLETE RUNS OF SIMILAR SYSTEMS, WAS COMPILED AND EXECUTED ON THE IBM370/195 AS A 1-MINUTE JOB.

7. UNUSUAL FEATURES OF THE PROGRAM - A BUILT-IN PROCEDURE FOR ESTABLISHING RELAXATION BLOCKS USES A RANDOM NUMBER PROCESS TO AVOID RELAXATION DIFFICULTIES ENCOUNTERED AS CONTACT GAPS OPEN AND CLOSE.

8. RELATED AND AUXILIARY PROGRAMS - BOW-V TREATS SIMILAR SYSTEMS, BUT WITH LESS GENERALITY. PARABOW EXTENDS NUBOW TO ALLOW ARBITRARILY MULTI-LINEAR STIFFNESS PARAMETERS FOR SEMI-EMPIRICAL MODELING OF THREE-DIMENSIONAL EFFECTS SUCH AS MIS-ALIGNMENT, CIRCUMFERENTIAL BOW, AND FRICTION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
IBM360 VERSION SUBMITTED SEPTEMBER 1974, REVISED EDITION B SUBMITTED JANUARY 1975, SAMPLE PROBLEM EXECUTED BY ACC JANUARY 1975 ON AN IBM370/195.

10. REFERENCES - G. A. MCLENNAN, NUBOW: A FORTRAN IV PROGRAM FOR THE STATIC ELASTIC ANALYSIS OF BOWED REACTOR CORES, ANL-8068, APRIL 1974.

11. MACHINE REQUIREMENTS - 240K WORDS OF MEMORY ARE REQUIRED TO COMPILE, 130K TO EXECUTE.

12. PROGRAMMING LANGUAGE USED - FORTRAN IV

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -

G. A. MCLENNAN
COMPONENTS TECHNOLOGY DIVISION
ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE -
    SOURCE DECK (727 CARDS)
    SAMPLE PROBLEM (28 CARDS)
    REFERENCE REPORT WITH ERRATA

17. CATEGORY - I
    KEYWORDS - REACTORS, 2-DIMENSIONAL ELASTIC STRUCTURAL ANALYSIS

1. NAME OR DESIGNATION OF PROGRAM - GETCOR,FRECOR

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370/195

3. DESCRIPTION OF PROBLEM OR FUNCTION - GETCOR AND FRECOR ARE ASSEMBLY LANGUAGE SUBROUTINES WHICH MAY BE CALLED FROM FORTRAN SUBROUTINES DURING EXECUTION TO ALLOCATE AND RELEASE CORE STORAGE. THOSE VARIABLES FOR WHICH CORE STORAGE IS TO BE ALLOCATED MUST BE PASSED AS ARGUMENTS OF THE FORTRAN SUBROUTINES. THESE PROGRAMS ALLOW VARIABLE DIMENSIONING IN SUBROUTINES WITHOUT A PREVIOUS SPECIFICATION OF THE MAXIMUM ALLOWABLE DIMENSIONS.

4. METHOD OF SOLUTION - GETCOR CHECKS TO DETERMINE IF THE DYNAMIC ALLOCATION REQUEST IS REASONABLE, WRITES ANY WARNING OR ERROR MESSAGES, AND CALLS SUBROUTINE ERROR IF THE REQUEST CANNOT BE HONORED. OTHERWISE, IT PROVIDES THE REQUESTED SPACE THROUGH THE GETMAIN MACRO, ALTERS THE TABLES OF THE CALLING PROGRAM AS NECESSARY, AND RETURNS CONTROL TO THE CALLING PROGRAM. FRECOR RELEASES SPACE IN THE SAME GENERAL MANNER BY USE OF THE FREEMAIN MACRO.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - BEFORE THE FORTRAN SUBROUTINE CAN RETURN TO ITS CALLER IT MUST RELEASE ALL CORE STORAGE ALLOCATED TO ANY OF ITS ARGUMENTS.

6. TYPICAL RUNNING TIME - LESS THAN ONE MILLISECOND IS REQUIRED TO ALLOCATE OR RELEASE STORAGE FOR ONE ARRAY.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED DECEMBER 1974.
IBM360 VERSION SUBMITTED SEPTEMBER 1974. SAMPLE PROBLEM EXECUTED BY ACC NOVEMBER 1974 ON AN IBM 370/195.

10. REFERENCES - R. C. DURFEE, FORTRAN DYNAMIC STORAGE ALLOCATION, ORNL-TM-3892, JULY 17, 1972.

11. MACHINE REQUIREMENTS - GETCOR OCCUPIES 1440 (DECIMAL) BYTES OF STORAGE AND FRECOR, 1328 BYTES.

12. PROGRAMMING LANGUAGES USED - FORTRAN IV AND ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/360,370.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS - THE TEST PROGRAM AS CODED OCCUPIES A 240K REGION.

15. NAME AND ESTABLISHMENT OF AUTHOR -

R. C. DURFEE
HOLIFIELD NATIONAL LABORATORY
P. O. BOX X
OAK RIDGE, TENNESSEE 37830

16. MATERIAL AVAILABLE -

SOURCE DECKS (896 CARDS)
SAMPLE PROBLEM (98 CARDS)
CONTROL INFORMATION (JCL 86 CARDS)
SAMPLE PROBLEM OUTPUT (6 SELECTED PAGES)
REFERENCE REPORT

17. CATEGORY - P

KEYWORDS - DYNAMIC STORAGE ALLOCATION

ACC ABSTRACT 645 03/75

1. NAME OR DESIGNATION OF PROGRAM - DYNAMIC ANALYSIS OF GASES

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360

3. DESCRIPTION OF PROBLEM OR FUNCTION - THE PROGRAM PROCESSES MASS SPECTRAL DATA TO DETERMINE THE RATE AT WHICH GASES EVOLVE FROM A SOLID SAMPLE AND THE TOTAL QUANTITY OF GAS EVOLVED. CALIBRATION DATA AND MASS-PEAK MEASUREMENTS ARE DESCRIBED AS INPUT DATA. GAS FLOW RATE AND GAS QUANTITY ARE DESCRIBED AS OUTPUT DATA. IT IS USED FOR THE DYNAMIC ANALYSIS OF GASES BY FAST SCANNING MASS SPECTROMETRY. ALTHOUGH WRITTEN FOR DATA OBTAINED FROM A BENDIX MODEL 12-107 TIME-OF-FLIGHT (TOF) MASS SPECTROMETER, IT MAY BE APPLIED TO ANY TYPE OF MASS SPECTROMETER. THE BENDIX MASS SPECTROMETER IS USED TO CONTINUALLY MONITOR GASES EVOLVED DURING VACUUM BAKEOUT OF SOLID SAMPLES. THE TECHNIQUE IS USED TO DETERMINE SURFACE CONTAMINANTS ADSORBED AND TRAPPED GASES AND OTHER VOLATILE OUTGAS PRODUCTS.

4. METHOD OF SOLUTION - THE RATE AT WHICH A GAS EVOLVES FROM A SOLID SAMPLE IS DETERMINED FROM A PEAK-HEIGHT MEASUREMENT AND A FLOW RATE FACTOR. THE ARITHMETIC EXPRESSION FOR GAS FLOW RATE WILL CONTAIN AS MANY CRACKING PATTERN COEFFICIENTS AS NEEDED TO CORRECT THE PARENT PEAK-HEIGHT MEASUREMENT OF THE SAMPLE GAS ANALYZED. THE QUANTITY OF GAS ANALYZED IN MILLIMOLES AND MOLECULES IS DETERMINED BY INTEGRATING THE GAS FLOW RATE OVER THE ELAPSED TIME OF ANALYSIS.

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - A TOTAL OF 12 GASES ARE USED IN THE PRESENT STUDY.

6. TYPICAL RUNNING TIME - THE SAMPLE PROBLEM EXECUTES IN A FEW MINUTES.

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS - THE PROGRAM WAS ORIGINALLY WRITTEN FOR USE WITH THE GENERAL ELECTRIC MARK 1 TIME SHARING SERVICE. THIS VERSION IS A MODIFICATION OF ALC-00229 TRANSFERRED FROM THE ALC-COSMIC COLLECTION.

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
GE400 MODIFIED VERSION SUBMITTED MAY 1970, REVISED TO RUN ON IBM360 AUGUST 1974, SAMPLE PROBLEM EXECUTED BY ACC.

10. REFERENCES - ROBERT W. LOSER, CAREY A. CHAMBER, EVAIN D. RUHY, A TIME-SHARING FORTRAN PROGRAM FOR THE DYNAMIC ANALYSIS OF GASES BY TIME-OF-FLIGHT MASS SPECTROMETRY, REP-1400, NOVEMBER 7, 1969.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - FORTRAN IV(G)

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - IBM360 TSO.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHORS -

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THE DOW CHEMICAL COMPANY
ROCKY FLATS DIVISION
P. O. BOX 888
GOLDEN, COLORADO 80401

16. MATERIAL AVAILABLE -
    SOURCE DECK (179 CARDS)
    SAMPLE PROBLEM (18 CARDS)
    REFERENCE REPORT

17. CATEGORY - U
    KEYWORDS - GASES, MASS SPECTROMETRY, FLOW RATE

1. NAME OR DESIGNATION OF PROGRAM - COPYCAT

2. COMPUTER FOR WHICH PROGRAM IS DESIGNED AND OTHERS UPON WHICH IT IS OPERABLE - IBM360,370

3. DESCRIPTION OF PROBLEM OR FUNCTION - COPYCAT IS AN OS UTILITY PROGRAM DESIGNED TO PRODUCE AN EFFICIENT SYSTEM-WIDE CATALOG WHICH MAY RESIDE ON MANY VOLUMES. SUBSTANTIAL IMPROVEMENT IN PERFORMANCE MAY ALSO BE OBTAINED ON A SYSTEM WITH ONLY A SINGLE CATALOG. FIRST, CATALOG ENTRIES FROM MANY DIFFERENT CATALOGS MAY BE REDISTRIBUTED TO EQUALIZE THE LOAD ON EACH CATALOG. SECOND, EACH INDIVIDUAL CATALOG IS RESTRUCTURED IN A WAY DESIGNED TO MINIMIZE THE I/O TIME REQUIRED FOR SEARCHING AND UPDATING. REDISTRIBUTION AND RESTRUCTURING PARAMETERS ARE UNDER USER CONTROL. MODEL DSCB'S FOR GENERATION DATA GROUPS AND ALIAS ENTRIES ARE ALSO PROCESSED. CATALOGS ON ALL DIRECT ACCESS DEVICES, INCLUDING DATA CELLS, ARE SUPPORTED. BACKUP COPIES MAY ALSO BE MADE.

4. METHOD OF SOLUTION -

5. RESTRICTIONS ON THE COMPLEXITY OF THE PROBLEM - MAXIMUM OF - 32 CATALOGS DEFINED AS INPUT
COPYCAT HAS BEEN DESIGNED FOR A CATALOG SYSTEM WHERE A HIGH LEVEL INDEX NAME, OTHER THAN A CVOL POINTER, MAY ONLY APPEAR IN ONE CATALOG. WHEN A CONFLICT IS FOUND, THE ENTRY FROM THE FIRST DEFINED INPUT CATALOG IS USED. WHEN MORE THAN ONE OUTPUT CATALOG IS PRODUCED, ONE IS DEFINED AS THE MASTER CATALOG AND THE OTHERS AS SECONDARY CATALOGS. COPYCAT MUST BE RUN ONCE TO PRODUCE THE MASTER CATALOG IN MASTER MODE, AND IF THERE ARE SECONDARY CATALOGS, ONCE IN SECONDARY MODE.

6. TYPICAL RUNNING TIME -

7. UNUSUAL FEATURES OF THE PROGRAM -

8. RELATED AND AUXILIARY PROGRAMS -

9. STATUS - ABSTRACT FIRST DISTRIBUTED OCTOBER 1974.
IBM360 VERSION SUBMITTED AUGUST 1974, REPLACED BY REVISED EDITION B DECEMBER 1974.

10. REFERENCES - DOUGLAS E. ENGERT, COPYCAT - OS CATALOG UTILITY PROGRAM, ANL-8103, MAY 1974.

11. MACHINE REQUIREMENTS -

12. PROGRAMMING LANGUAGE USED - ASSEMBLY LANGUAGE

13. OPERATING SYSTEM OR MONITOR UNDER WHICH PROGRAM IS EXECUTED - OS/MVT, OS/MFT, OS/VS1 AND OS/VS2 RELEASE 1.

14. ANY OTHER PROGRAMMING OR OPERATING INFORMATION OR RESTRICTIONS -

15. NAME AND ESTABLISHMENT OF AUTHOR -
D. E. ENGERT
APPLIED MATHEMATICS DIVISION
ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60439

16. MATERIAL AVAILABLE - MAGNETIC TAPE TRANSMITTAL
SOURCE DECK (2093 CARDS)
OBJECT DECK (216 CARDS)
DOCUMENTATION (TAPE DESCRIPTION FILE 1, 27 CARDS, REPORT TEXT FILES 4 AND 5, 112 RECORDS)
REFERENCE REPORT, ANL-8103

17. CATEGORY - P
KEYWORDS - OPERATING SYSTEMS, DATA PROCESSING, UTILITY ROUTINE

VI. LIBRARY PROGRAMS BY PROBLEM CLASSIFICATION

14 HAFEVER HAFEVER CALCULATES THE ENERGY EXCHANGE INELASTIC SCATTERING CROSS SECTION ACCORDING TO THE HAUSER-FESHBACH THEORY MODIFIED TO INCLUDE THE EFFECT OF SPIN-ORBIT COUPLING. THE CROSS SECTION IS INTEGRATED OVER ANGLE.

41 ZUT ZUT COMPUTES RESONANCE INTEGRALS FROM RESONANCE PARAMETERS FOR A WIDE VARIETY OF TEMPERATURES, COMPOSITIONS, AND GEOMETRIES FOR THE RESOLVED RESONANCES.

42 TUZ TUZ COMPUTES RESONANCE INTEGRALS FOR A WIDE VARIETY OF TEMPERATURES, COMPOSITIONS, AND GEOMETRIES FOR THE UNRESOLVED RESONANCES.

56 SUMMIT SUMMIT EVALUATES THE DIFFERENTIAL ENERGY-TRANSFER CROSS SECTION FOR SCATTERING BY A CRYSTALLINE MODERATOR, UTILIZING THE SO-CALLED PHONON EXPANSION. THE SCATTERING KERNEL FOR A 1-PHONON CHANGE IN ENERGY IS ADDED TO THAT FOR A 2-PHONON ENERGY EXCHANGE, AND SO ON. THIS PROGRAM HAS BEEN USED TO DETERMINE SCATTERING MATRICES FOR BERYLLIUM, GRAPHITE, AND OXYGEN.

SIGMA(E(O) TO E)/SIGMA(O)=(((M+1)/M)**2) * SQRT(E/E(O)) * 1/2
THE INTEGRAL FROM -1 TO 1 OF SIGMA(E(O) TO E,COS(THETA))
D(COS(THETA))
WHERE E(O) AND E ARE THE INITIAL AND FINAL ENERGIES, THETA IS THE ANGLE OF SCATTERING, SIGMA(O) THE FREE-ATOM CROSS SECTION, AND M THE RATIO OF THE MASS OF THE SCATTERING NUCLEUS TO THAT OF THE NEUTRON.

89 ARES2 ARES2 IS USED TO CALCULATE EFFECTIVE RESONANCE INTEGRALS AND MULTIGROUP CROSS SECTIONS FOR LUMPS AND MIXTURES USING RESONANCE PARAMETERS. IT COMBINES IN A SINGLE CODE, THE RESOLVED, UNRESOLVED, AND 1/V PARTS OF THE CALCULATION WHICH WERE PREVIOUSLY IN SEPARATE CODES. THE MULTIGROUP CROSS SECTIONS ARE PRINTED IN A FORM FOR USE IN MULTIGROUP REACTOR CALCULATIONS. FOR EXAMPLE, THEY CAN BE INSERTED INTO THE AIM6 (ACC ABSTRACT 29) OR FAIM (ACC ABSTRACT 120) LIBRARIES. THE ENERGY BREAKPOINTS ARE INPUT DATA AND A RESONANCE PARAMETER LIBRARY IS INCLUDED.

171 NEARREX NEARREX COMPUTES NEUTRON-INDUCED, AVERAGE FLUCTUATION (OR COMPOUND NUCLEUS) CROSS SECTIONS. PROVISION IS MADE FOR THE COMPUTATION OF COMPOUND ELASTIC AND INELASTIC NEUTRON CROSS SECTIONS, RADIATIVE CAPTURE AND FISSION CROSS SECTIONS, AS WELL AS OTHER PROCESSES, SUCH AS PROTON EMISSION. IT CAN ALSO BE USED TO COMPUTE PROTON-INDUCED AVERAGE CROSS SECTIONS.

176 RAPTURE THIS CODE COMPUTES RESONANCE INTEGRALS, AVERAGES THEM OVER RESONANCE PARAMETRIC DISTRIBUTIONS, AND COMPUTES FISSION AND CAPTURE CROSS SECTIONS AS A FUNCTION OF FUEL TEMPERATURE AND OF POTENTIAL SCATTERING CROSS SECTION PER ABSORBER ISOTOPE.

177 DOPIE DOPIE WAS DEVELOPED TO STUDY THE EFFECTS OF -

(1) OVERLAP OF RESONANCES OF UNLIKE FUEL ISOTOPES SUCH AS U238 AND THE PLUTONIUM ISOTOPES, AND
(2) THE TEMPERATURE DEPENDENCE OF THE AVERAGE FLUX OVER AN ENERGY INTERVAL CONTAINING RESONANCES IN THE CALCULATION OF THE DOPPLER COEFFICIENT.

DOPIE COMPUTES FLUX-AVERAGED CROSS SECTIONS OVER A GIVEN ENERGY RANGE UNDER THE FOLLOWING ASSUMPTION

(1) INTERFERENCE SCATTERING CORRECTIONS WILL BE SMALL AND CAN BE IGNORED.
(2) SCATTERED NEUTRONS ARE DISTRIBUTED UNIFORMLY OVER THE RANGE OF ENERGY DEGRADATION CONSTANT FOR EACH MATERIAL.
(3) ALL RESONANCES ARE RESOLVED OR CAN BE TREATED AS RESOLVED.
(4) LEAKAGE IS INSIGNIFICANT, MAKING SIGMA R(J) = POTENTIAL SCATTERING.

203 COMBCO (40.027S) THE PROGRAM PERMITS COMPUTING AND CONVOLUTING A COMBINATION CROSS SECTION CURVE COMPOSED OF THE CROSS SECTION CURVES OF A SAMPLE AND UP TO FOUR CONTAMINANTS.

208 TRIX1 TRIX1 CALCULATES MULTI-GROUP, DOPPLER-BROADENED EFFECTIVE RESONANCE INTEGRALS AND CROSS SECTIONS AND THEIR TEMPERATURE COEFFICIENTS FOR A HETEROGENEOUS RESONANCE ABSORBER. USING BASIC RESONANCE PARAMETERS, GEOMETRY AND CONCENTRATIONS, THE CODE COMBINES RESOLVED RESONANCE, UNRESOLVED RESONANCE, AND 1/V AND NEGATIVE ENERGY RESONANCE CALCULATIONS. FISSILE ISOTOPE CALCULATION IS AVAILABLE. L=1 UNRESOLVED RESONANCE CALCULATIONS ARE AVAILABLE FOR ISOTOPES OF ALL SPINS. EQUIVALENCE RELATIONSHIPS ARE CODED FOR CYLINDERS, SPHERES, AND PLANES. INTERFERENCE BETWEEN RESONANCE AND POTENTIAL SCATTERING AND ITS TEMPERATURE DEPENDENCE ARE AVAILABLE. THE NARROW-RESONANCE, INFINITE-MASS, AND INTERMEDIATE REPRESENTATIONS OF SCATTERINGS WITH ABSORBER ATOMS ARE ALL AVAILABLE. THE ISOLATED SINGLE-LEVEL BREIT-WIGNER LINE SHAPE IS USED.

214 MISH MASH THE PROGRAM COMPUTES RESONANCE INTEGRALS FOR INFINITE HOMOGENEOUS MIXTURES FOR ABOVE THERMAL ENERGIES. THE MAJOR PHYSICAL APPROXIMATION IS THAT RESONANCES ARE REPRESENTED BY THE SINGLE-LEVEL BREIT-WIGNER FORMULATION. IT IS ALSO ASSUMED THAT SCATTERING IS ELASTIC AND THAT A NONRESONANT MATERIAL HAS A CONSTANT SCATTERING CROSS SECTION.

215 CHAD CHAD IS DESIGNED TO FACILITATE ANALYSIS AND HANDLING OF DIFFERENTIAL NEUTRON SCATTERING DATA. IT PRODUCES LEGENDRE SCATTERING COEFFICIENTS FROM ANGULAR DISTRIBUTION DATA TABULATED IN MANY DIFFERENT FORMATS. IT CAN TRANSFORM ANGULAR DATA INTO LEGENDRE SCATTERING COEFFICIENTS IN EITHER THE LABORATORY OR THE CENTER-OF-MASS FRAME OF REFERENCE. IT CALCULATES THE AVERAGE COSINE OF THE SCATTERING ANGLE IN THE LABORATORY SYSTEM AND THE AVERAGE LOGARITHMIC ENERGY DECREMENT PER ELASTIC COLLISION.

216 FSDP3 FSDP3 COMPUTES POINTWISE CROSS SECTIONS FROM SINGLE-LEVEL BREIT-WIGNER RESONANCE PARAMETERS.

217 LEGCOEF3/GEORGE CALCULATES LEGENDRE EXPANSION COEFFICIENTS FOR THE ANGULAR DISTRIBUTION OF ELASTICALLY SCATTERED NEUTRONS.

238 EXT/XC GIVEN A SET OF BREIT-WIGNER RESONANCE PARAMETERS (ZERO TEMPERATURE) EXT CALCULATES THE EFFECTIVE DOPPLER-BROADENED CROSS SECTIONS FOR ANY TEMPERATURE. THE EFFECTIVE CROSS SECTION WHEN MULTIPLIED BY THE TARGET DENSITY AND THE NEUTRON VELOCITY (LAB) GIVES THE REACTION RATE PER INCIDENT NEUTRON. A MAXWELLIAN VELOCITY DISTRIBUTION IS ASSUMED FOR THE TARGET NUCLEI. THE ANALYSIS IS CARRIED OUT FOR SUFFICIENTLY LOW ENERGIES SO THAT ONLY ZERO NEUTRON ANGULAR MOMENTA (L = 0) INTERACTIONS ARE IMPORTANT. INTERFERENCE BETWEEN LEVELS IS NEGLECTED, HOWEVER, INTERFERENCE BETWEEN RESONANCE SCATTERING AND POTENTIAL SCATTERING IS INCLUDED. THERE ARE PROVISIONS FOR ADDING A CORRECTION CROSS SECTION OF THE FORM 1.0/SQRT(E) FOR LEVELS NOT EXPLICITLY CONSIDERED. ALSO THE CROSS SECTION IN THE WINGS OF A NEGATIVE ENERGY RESONANCE, CONSTANT/(SQRT(E)*(E-E0)**2) MAY BE ADDED.

247 FLANGE1 FLANGE1 COMPUTES NEUTRON SCATTERING KERNELS FOR A LARGE CLASS OF MODERATORS. NEUTRON SCATTERING KERNELS ARE OBTAINED FROM THE SCATTERING LAW COMPUTED BY THE CODE GASKET. FLANGE1 ALLOWS THE CALCULATION OF DOUBLE DIFFERENTIAL CROSS SECTIONS, ANGULAR CROSS SECTIONS, TOTAL CROSS SECTIONS, AND LEGENDRE MOMENTS OF THE SCATTERING KERNEL. THE SHORT COLLISION TIME APPROXIMATION IS USED FOR ENERGY TRANSFERS LARGER THAN THE MAXIMUM PROVIDED BY GASKET.

254 2PLUS THE 2PLUS CODE SOLVES THE PROBLEM OF THE SCATTERING OF CHARGED OR UNCHARGED NUCLEONS BY A NUCLEUS REPRESENTED BY A DEFORMED NUCLEAR POTENTIAL. THE MODEL ASSUMES THAT THE TARGET NUCLEUS HAS A 0+ GROUND STATE AND A 2+ FIRST EXCITED LEVEL, AND THE INTERACTION POTENTIAL HAS A QUADRUPOLE DEFORMATION. A HAUSER-FESHBACH COMPOUND NUCLEUS CALCULATION HAS BEEN INCLUDED. THE OUTPUT CONTAINS TOTAL, POTENTIAL ELASTIC, POTENTIAL INELASTIC (2+), REACTION, AND COMPOUND NUCLEUS CROSS SECTIONS AS WELL AS ELASTIC AND INELASTIC ANGULAR DISTRIBUTIONS.

263 GASKET GASKET CALCULATES THE THERMAL NEUTRON SCATTERING LAW, S(ALPHA,BETA), FOR A LARGE CLASS OF MODERATORS. PROVISION HAS BEEN MADE IN GASKET FOR THE FOLLOWING DYNAMICAL MODES OF THE SCATTERER -

(1) FREE TRANSLATION (GAS).
(2) DIFFUSIVE OR BROWNIAN MOTION.
(3) HARMONIC ISOTROPIC VIBRATIONS WITH CONTINUOUS FREQUENCY SPECTRUM.
(4) HARMONIC ANISTROPIC VIBRATIONS WITH CONTINUOUS FREQUENCY SPECTRUM (AS APPLIED FOR INSTANCE TO GRAPHITE).
(5) HARMONIC ISOTROPIC VIBRATIONS WITH DISCRETE FREQUENCY SPECTRUM.

289 GAKER THE GAKER CODE EVALUATES THE INELASTIC DOUBLE-DIFFERENTIAL NEUTRON SCATTERING CROSS SECTIONS FOR MODERATORS WITH PHONON SPECTRA WHICH CAN BE REPRESENTED AS SUMS OF DELTA-FUNCTIONS. IT IS BASED ON THE ORIGINAL MODEL FOR LIGHT WATER BY NELKIN, WHICH CONSISTED OF A TRANSLATOR, A HINDERED ROTATOR (TREATED AS AN ISOTROPIC OSCILLATOR), AND SEVERAL VIBRATIONAL OSCILLATORS. THE CODE HAS BEEN MODIFIED SEVERAL TIMES TO INCLUDE MORE OSCILLATORS AND TO TREAT ANISOTROPIC EFFECTS. FINAL ENERGY-INTEGRATED CROSS SECTIONS ARE ALSO CALCULATED.

292 PSEUDO RESONANCE PARAMETERS ARE CONSTRUCTED FROM AVERAGE NUCLEAR PROPERTIES IN THE RESOLVED RESONANCE REGION.

305 STRIP CAPTURE AND FISSION RESONANCE INTEGRALS ARE CALCULATED BY A FAST METHOD IN THE RESOLVED RESONANCE RANGE, TAKING EXPLICIT ACCOUNT OF OVERLAP AND INTERFERENCE BETWEEN RESONANCES IN A MIXTURE OF RESONANCE ABSORBERS. THE RESONANCE INTEGRALS ARE CALCULATED OVER ARBITRARY ENERGY BANDS. OPTIONALLY, THE NEUTRON FLUX AS A FUNCTION OF ENERGY IN ONE OR TWO REGIONS MAY BE PRINTED OUT.

308 JUPITOR1(JP1) JUPITOR1 IS USED TO PERFORM COUPLED-CHANNEL CALCULATIONS TO EVALUATE THE CROSS SECTIONS FOR THE SCATTERING OF NUCLEAR PARTICLES BY VARIOUS COLLECTIVE NUCLEII.

323 MUFFLE THIS PROGRAM COMPUTES THE NEUTRON CROSS SECTIONS FOR A FISSILE NUCLIDE IN WHICH ONE TO THREE REACTION CHANNELS ARE OPEN FOR THE FISSION PROCESS. PROVISION IS MADE FOR TWO INDEPENDENT SPIN STATES WITH INTERFERING LEVELS AS WELL AS A SET OF NON-INTERFERING LEVELS. THE CROSS SECTIONS ARE INTEGRATED OVER A SPECIFIED GROUP STRUCTURE TO YIELD RESONANCE INTEGRALS.

334 PEGGY PEGGY IS A LEAST SQUARES SEARCH PROGRAM WHICH ANALYZES, IN TERMS OF PHASE SHIFTS, THE ELASTIC SCATTERING OF SPIN ZERO AND SPIN ONE-HALF PARTICLES BY SPIN ZERO NUCLEI. REAL OR COMPLEX PHASE SHIFTS MAY BE USED WITH OR WITHOUT SPIN-ORBIT COUPLING. DIFFERENTIAL CROSS SECTION AND POLARIZATION ANGULAR DISTRIBUTIONS MAY BE ANALYZED EITHER SEPARATELY OR SIMULTANEOUSLY.

335 RAMES RAMES COMPUTES BOTH LOCAL AND NONLOCAL RADIAL INTEGRALS OF A VARIETY OF RADIAL OPERATORS USING SINGLE-PARTICLE WAVE FUNCTIONS WHICH ARE EIGENSTATES OF MOTION IN A WOODS-SAXON POTENTIAL WELL. THE OPERATORS CURRENTLY AVAILABLE ARE R**N, N=0,1,2,3,4,5 AND THE DERIVATIVE WITH RESPECT TO X OF 1/(EXP(X)+1) WHERE X=(R-R(0))/A(0).

341 GANDY3 GANDY3 EVALUATES TEMPERATURE-DEPENDENT EFFECTIVE NEUTRON CAPTURE, FISSION, AND SCATTERING CROSS SECTIONS IN THE UNRESOLVED RESONANCE REGION FROM AVERAGE RESONANCE PARAMETERS.

347 CODILLI A LEAST SQUARES ANALYSIS OF NEUTRON RESONANCE DATA IS PERFORMED USING THE MULTI-LEVEL EXPANSION. THE PROGRAM CAN HANDLE ONLY ONE SET OF CROSS SECTIONS AT A TIME. OPTIONS ARE PROVIDED FOR THE ANALYSIS OF REACTION OR TOTAL CROSS SECTION DATA, AND FOR THE DIRECT HANDLING OF TRANSMISSION DATA. BY OPTION, ONE CAN INCLUDE THE MULTI-LEVEL INTERFERENCE OR PERFORM THE FIT IN TERMS OF SUPERIMPOSED SYMMETRIC BREIT-WIGNER LINES, WHILE THE POTENTIAL SCATTERING INTERFERENCE IS ALWAYS INCLUDED IN THE TRIAL FUNCTION FOR THE TOTAL CROSS SECTION. PROVISIONS ARE GIVEN FOR GAUSSIAN AND NON-GAUSSIAN RESOLUTION FUNCTIONS. IN THE LATTER CASE, MODIFICATION OF ONE SUBROUTINE ALLOWS FOR ADAPTATION TO ANY KIND OF EXPERIMENTAL CONDITIONS. THE RELEVANT CONVOLUTION INTEGRALS INVOLVING THE TRIAL FUNCTION ARE EVALUATED BY SIMPSON INTEGRATION WITH AN OPTIONAL NUMBER OF INTEGRATION STEPS. BESIDES THE RESONANCES TO BE FITTED, THE TRIAL FUNCTION CONTAINS AN OPTIONAL NUMBER OF RESONANCES HAVING KNOWN PARAMETERS, WHICH MAY REPRESENT RESONANCES EXTERNAL TO THE REGION BEING FITTED AS WELL AS RESONANCES WITHIN THE ENERGY INTERVAL OF INTEREST, THUS PERMITTING IMPURITY EFFECTS TO BE DESCRIBED, OR, IF NEEDED, SPIN STATES SEPARATED.

359 PUN1 PUN1 EVALUATES UNRESOLVED RADIATIVE CAPTURE INTEGRALS AND RELATED MULTIGROUP CROSS SECTIONS. THE UNRESOLVED DISTRIBUTIONS MAY HAVE VARIOUS ORBITAL ANGULAR MOMENTUM QUANTUM NUMBERS AND THE EFFECTS OF DOPPLER BROADENING AND SELF-SHIELDING ARE INCLUDED.

360 TCR THE TCR PORGRAM CALCULATES THE SCATTERING LAW FOR A CRYSTALLINE MATERIAL IN THE INCOHERENT APPROXIMATION, FROM THE PHONON FREQUENCY DISTRIBUTION AND A SPECIFIED TEMPERATURE. A PROPORTIONAL QUANTITY IS FUNCHED IN THE FORM OF A TABLE FOR INTERPOLATION OF THE DOUBLE DIFFERENTIAL CROSS SECTION. AS AN ALTERNATIVE, THE PROGRAM OBTAINS THE ANALOGOUS QUANTITIES FOR A MONATOMIC GAS.

376 AVERAGE AVERAGE CALCULATES AVERAGE SCATTERING, CAPTURE, AND FISSION CROSS SECTIONS FROM S- AND P-WAVE DATA OF THE UNRESOLVED PARAMETERS OF FILE 2 OF ENDF/B.

377 SIGPLOT SIGPLOT CALCULATES THE SCATTERING, CAPTURE, FISSION, AND TOTAL CROSS SECTIONS FROM RESONANCE PARAMETERS OF VERSION I DATA FROM FILE 2 OF ENDF/B. SCATTERING CROSS SECTIONS MAY BE CALCULATED WITH OR WITHOUT LEVEL-LEVEL INTERFERENCE. PROVISION IS ALSO MADE TO NUMERICALLY DOPPLER-BROADEN ANY OF THE CROSS SECTIONS.

381 LYNNE LYNN PERFORMS A MULTIPOLE EXPANSION OF THE WOODS-SAXON POTENTIAL. THE NUMBERS GENERATED ARE SUITABLE FOR MICROSCOPIC CALCULATIONS OF INELASTIC SCATTERING FROM NUCLEI WHICH USE A WOODS-SAXON INTERACTION BETWEEN THE PROJECTILE AND THE TARGET NUCLEONS.

385 COHBE/PREP THE PROGRAMS, PREP AND COHBE CALCULATE THE COHERENT ONE-PHONON SCATTERING LAW FOR POLYCRYSTALLINE BERYLLIUM, USING AN ISOTROPIC DEBYE-WALLER FACTOR AS AN APPROXIMATION FOR BERYLLIUM. THE DEBYE-WALLER FACTOR W IS CONSISTENT WITH THE DEFINITION EXP**(-2*W*ALPHA) IN THE SCATTERING LAW.

399 SUMOR(M0271) SUMOR CALCULATES S-WAVE NEUTRON CROSS SECTIONS AT SELECTED ENERGIES. THE CROSS SECTIONS ARE CALCULATED IN THREE APPROXIMATIONS TO R-MATRIX THEORY - THE REICH AND MOORE APPROXIMATION, THE FESHBACH, PORTER, AND WEISSKOPF APPROXIMATION, AND THE SUMS OF SINGLE-LEVEL FORMULAE APPROXIMATION. THESE CALCULATED CROSS SECTIONS OR, ALTERNATIVELY, INPUT LISTS OF CROSS SECTIONS, ARE DOPPLER BROADENED USING EXACT CALCULATION FOR TARGET NUCLEI IN MAXWELLIAN MOTION. CALCULATED CROSS SECTIONS OR CROSS SECTIONS DIVIDED BY NEUTRON ENERGY CAN BE INTEGRATED BETWEEN ARBITRARY ENERGY LIMITS.

410 TACASI TACASI IS USED TO DETERMINE THE PARAMETERS OF A SINGLE NEUTRON RESONANCE. THE CODE ACCEPTS MEASURED VALUES OF CAPTURE AREAS, SELF-INDICATION AREAS, SELF-INDICATION RATIOS AND TRANSMISSION AREAS AND THEIR ASSOCIATED UNCERTAINTIES IN ANY COMBINATION AND DETERMINES BEST ESTIMATES OF THE NEUTRON AND RADIATION WIDTHS AND THEIR STANDARD DEVIATIONS.

417 ATHENA4 ATHENA4 COMPUTES FORM FACTORS FOR INELASTIC SCATTERING CALCULATIONS, USING SINGLE-PARTICLE WAVE FUNCTIONS THAT ARE EIGENSTATES OF MOTION IN EITHER A WOODS-SAXON POTENTIAL WELL OR A HARMONIC OSCILLATOR WELL. TWO-BODY FORCES OF GAUSS, COULOMB, YUKAWA, AND A SUM OF CUT-OFF YUKAWA RADIAL DEPENDENCES ARE AVAILABLE.

465 RESEND/ADLER RESEND GENERATES INFINITELY DILUTE, UNBROADENED POINT CROSS SECTIONS IN THE ENDF FORMAT BY COMBINING ENDF FILE 3, BACKGROUND CROSS SECTIONS WITH POINTS CALCULATED FROM ENDF FILE 2, RESONANCE PARAMETER DATA.

ADLER CALCULATES TOTAL, CAPTURE AND FISSION CROSS SECTIONS FROM THE CORRESPONDING ADLER-ADLER PARAMETERS IN THE ENDF/B FILE 2 VERSION II DATA AND ALSO DOPPLER-BROADENS CROSS SECTIONS.

470 GRAMP GRAMP RANDOMLY GENERATES REICH AND MOORE PARAMETERS FOR MULTILEVEL UNRESOLVED RESONANCES OF FISSILE ISOTOPES.

482 COMNUC/CASCADE COMNUC CALCULATES NEUTRON REACTION CROSS SECTIONS USING A STATISTICAL MODEL FOR DECAY OF THE COMPOUND NUCLEUS. COMPETING REACTION TYPES PERMITTED ARE ELASTIC, DISCRETE AND CONTINUUM INELASTIC, GAMMA RAY EMISSION, CAPTURE, FISSION, AND N,2N.

CASCADE SOLVES THE INTRANUCLEAR GAMMA RAY CASCADE EQUATION TO DETERMINE SECONDARY PARTICLE EMISSION PROBABILITIES. COMPETING PROCESSES CONSIDERED ARE GAMMA RAY EMISSION, NEUTRON EMISSION AND FISSION.

492 RAMP1 RAMP1 CALCULATES SCATTERING, CAPTURE, FISSION AND TOTAL CROSS SECTIONS FROM REICH-MOORE RESOLVED RESONANCE PARAMETERS. THE RESONANCE PARAMETERS ARE ASSUMED TO BE IN ENDF/B VERSION II DATA FORMAT. CROSS SECTIONS MAY BE DOPPLER BROADENED IF SO DESIRED.

504 THRESH THRESH CALCULATES NEUTRON-INDUCED REACTION CROSS SECTIONS FROM 0 TO 20 MEV AND FISSION SPECTRUM AVERAGES FOR NUCLIDES HAVING 21 TO 50 PROTONS. REACTION PRODUCTS CONSIDERED ARE 2N, 3N, P, D, T, HE-3, ALPHA, NP, ND, NT, NHE-3, N-ALPHA, PN, 2P, P-ALPHA, ALPHA-N, ALPHA-P, AND DN.

506 JP1XR P1XR COMPUTES SCATTERING CROSS SECTIONS AND RELATED QUANTITIES FOR THE SCATTERING OF NUCLEONS OR COMPOSITE PARTICLES FROM ANY COLLECTIVE NUCLEUS, EVEN OR ODD A, VIBRATIONAL OR ROTATIONAL. THE PROJECTILE CAN BE CHARGED OR UNCHARGED AND CAN HAVE SPIN 0, 1/2, OR 1.

507 PHASER HASER COMPUTES THE FOLLOWING QUANTITIES FOR THE SCATTERING OF NEUTRONS FROM NUCLEII - TOTAL, ELASTIC, AND REACTION CROSS SECTIONS, DIFFERENTIAL SHAPE AND COMPOUND ELASTIC CROSS SECTIONS, DIFFERENTIAL POLARIZATIONS, DIFFERENTIAL AND INTEGRATED COMPOUND LEVEL INELASTIC CROSS SECTIONS, COMPOUND AND SHAPE ELASTIC LEGENDRE MOMENTS IN THE CENTER-OF-MASS SYSTEM.

524 BESFIT BESFIT CALCULATES DIFFERENTIAL ELASTIC SCATTERING CROSS SECTIONS USING A BESSEL FUNCTION EXPANSION, BASED ON A DIFFRACTION MODEL. CONSTANT TERMS MAY EITHER BE SUPPLIED AS INPUT DATA OR OBTAINED BY A LEAST SQUARES FITTING OF THE DATA.

531 CLEM CLEM GENERATES CONSTRAINED LEGENDRE MOMENTS FOR NEUTRON SCATTERING ANGULAR DISTRIBUTIONS. THE CONSTRAINT IS THAT THE ANGULAR DISTRIBUTION ITSELF SHOULD BE NON-NEGATIVE.

535 MULTI MULTI COMPUTES SCATTERING CROSS SECTIONS.

553 U3R U3R NUMERICALLY CONSTRUCTS A TABLE OF THE CUMULATIVE PROBABILITY DISTRIBUTION FUNCTIONS OF UNRESOLVED RESONANCE CROSS SECTIONS IN A NARROW ENERGY RANGE.

639 POLLA THE PROGRAM TRANSFORMS A SET OF R-MATRIX NUCLEAR RESONANCE PARAMETERS INTO A SET OF EQUIVALENT S-MATRIX (OR KAPUR-PEIERLS) RESONANCE PARAMETERS.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

33 GAM1/REP/UPDATE THIS PROGRAM COMPUTES THE SLOWING-DOWN SPECTRUM IN EITHER THE P1 OR THE B1 APPROXIMATION USING 68 GROUPS OF NEUTRONS WITH A CONSTANT GROUP WIDTH DU=0.25, MULTIGROUP CONSTANTS ARE CALCULATED FOR UP TO 32 FAST GROUPS.

50 TEMPEST2 TEMPEST2 IS A NEUTRON THERMALIZATION PROGRAM BASED UPON THE WIGNER-WILKINS APPROXIMATION FOR LIGHT MODERATORS AND THE WILKINS APPROXIMATION FOR HEAVY MODERATORS. A MAXWELLIAN DISTRIBUTION MAY ALSO BE USED. THE MODEL USED MAY BE SELECTED AS A FUNCTION OF ENERGY. THE SECOND-ORDER DIFFERENTIAL EQUATIONS ARE INTEGRATED DIRECTLY RATHER THAN TRANSFORMED TO THE RICCATI EQUATION. THE PROGRAM PROVIDES MICROSCOPIC AND MACROSCOPIC CROSS SECTION AVERAGES OVER THE THERMAL NEUTRON SPECTRUM.

51 FORM THE FORM, OR FORTRAN-MUFT, PROGRAM IS A FOURIER TRANSFORM SLOWING-DOWN CODE. A LIBRARY TAPE CONTAINING 54-GROUP MICROSCOPIC CROSS SECTIONS, RESONANCE PARAMETERS, INELASTIC SCATTERING MATRICES, AND SOURCE SPECTRA IS USED TO GENERATE A 54-GROUP FLUX SPECTRUM AND FEW-GROUP CONSTANTS.

52 SAIL THE MONOENERGETIC NEUTRON TRANSPORT EQUATION IS SOLVED USING THE DISCRETE SN METHOD FOR A ONE-DIMENSIONAL PLANE CELL. CELL PROPERTIES ARE COMPUTED.

53 S4 CYLINDRICAL GEOMETRY CELL C THIS PROGRAM SOLVES THE ONE-DIMENSIONAL MONOENERGETIC BOLTZMANN EQUATION IN CYLINDRICAL GEOMETRY, USING THE S4 APPROXIMATION. IN ADDITION TO THE FLUX DISTRIBUTION, CELL-AVERAGED PARAMETERS ARE COMPUTED.

108 BAM BAM COMPUTES THERMAL CONSTANTS, SPATIAL AND ENERGY DISTRIBUTIONS IN HETEROGENEOUS CYLINDRICAL CELLS BY ASSUMING SEPARABILITY OF SPACE AND ENERGY IN THE BOLTZMANN EQUATION.

113 ZOT ZOT TAKES MULTIGROUP NEUTRON CROSS SECTION SETS IN THE SN FORMAT (SNG, DSN, ETC.) AND REDUCES THE NUMBER OF GROUPS (COLLAPSES) ACCORDING TO A GIVEN OR COMPUTED MULTIGROUP FLUX SPECTRUM. AVERAGE VELOCITIES FOR THE FEW-GROUP SET MAY BE GENERATED ON THE BASIS OF THE FLUXES AND VOLUMES FOR A GIVEN REACTOR CONFIGURATION.

119 QUICKIE QUICKIE SOLVES THE NEUTRON SLOWING DOWN AND THERMALIZATION PROBLEM IN INFINITE MEDIA BY INVERTING A SET OF SIMULTANEOUS MULTIGROUP EQUATIONS. THE CODE USES THE ULCER (ACC ABSTRACT 118) LIBRARY TAPE AND IS IN EXCELLENT AGREEMENT WITH ULCER FOR THOSE CASES WHERE BUCKLING IS KNOWN.

147 AILMOE AILMOE IS A MODIFIED FORM OF THE ANL ELMOE PROGRAM. THE FOURIER TRANSFORM OF THE FAST NEUTRON FLUX IS FOUND FOR A MIXTURE OF MODERATORS HEAVIER THAN HYDROGEN WITH THE MODERATOR SCATTERING LAW RIGOROUSLY ACCOUNTED FOR.

149 TYCHE3 TYCHE3 IS A MONTE CARLO CODE DESIGNED TO FIND THE SECOND, FOURTH AND SIXTH MOMENTS OF THE NEUTRON SLOWING DOWN DENSITY DISTRIBUTION IN AN INFINITE HOMOGENEOUS MEDIUM. NEUTRON WEIGHTS ARE USED TO AVOID THE TERMINATION OF A HISTORY BY ABSORPTION AND MINIMIZE THE RUNNING TIME. PROVISIONS ARE MADE FOR RESTART OF NON-CONVERGED PROBLEMS, GRAPHICAL DISPLAYS OF THE MOMENTS AND AVERAGE FISSION ENERGY AS A FUNCTION OF THE NUMBER OF SETS OF HISTORIES AND CALCULATION OF THE CORRECTION TO FLUX MOMENTS.

150 DANCOFF JR. THIS CODE EVALUATES MODERATOR SPACE CHORD DISTRIBUTION FUNCTIONS OF ZEROTH AND FIRST ORDER, PLUS THEIR LINEAR, SQUARE, LOGARITHMIC AND EXPONENTIAL MOMENTS, FOR REGULAR AND IRREGULAR LATTICES OF CYLINDRICAL FUEL RODS CLAD WITH MATERIAL OF NEGLIGIBLE TOTAL CROSS SECTION. OF PARTICULAR SIGNIFICANCE FOR REACTOR DESIGN CALCULATIONS IS THE EXPONENTIAL MOMENT, OR DANCOFF CORRECTION, WHICH CAN BE CALCULATED EXACTLY IN INFINITE SQUARE AND HEXAGONAL LATTICES, IN CLUMPED SQUARE LATTICES WITH STRAIGHT OR CRUCIFORM WATER GAPS, OR IN CLUSTERS OF TWO, THREE, SEVEN, AND NINETEEN FUEL RODS.

160 SCPHIST SCPHIST1 CALCULATES TEMPERATURE-DEPENDENT MULTIGROUP ENERGY TRANSFER COEFFICIENTS FOR A MAXWELL GAS MODERATOR WITH ELASTIC, ISOTROPIC SCATTERING IN THE CENTER OF MASS SYSTEM. SCPHIST2 CALCULATES TEMPERATURE-DEPENDENT MULTIGROUP CROSS SECTIONS FOR A MAXWELL GAS. SCPHIST5 CALCULATES MULTIGROUP ENERGY TRANSFER MATRICES FOR ANISOTROPIC ELASTIC SCATTERING.

162 GRAVE GRAVE IS THE PROGRAM TO FORM GROUP-AVERAGED CROSS SECTIONS USING THE NEUTRON CROSS SECTION MASTER TAPE DEVELOPED UNDER THE ATOMICS INTERNATIONAL AUTOMATED CROSS SECTION PROGRAM. NINETEEN GROUP-AVERAGED PARAMETERS ARE OBTAINABLE AS FOLLOWS - SIGMA T, SIGMA EL, SIGMA N, SIGMA F, NUBAR, MUBAR, XIBAR, SIGMA IN, SIGMA N-ALPHA, SIGMA N-P, SIGMA N-2N, SIGMA A, SIGMA TR, SIGMA NON-EL, ALPHABAR, XI*SIGMA EL, NU* SIGMA F, MUBAR*SIGMA EL, AND SIGMA R.
THE SPECTRUM IS CONSTRUCTED FROM A COMBINATION OF FISSION, E**-N, POWER SERIES, MAXWELLIAN OR INPUT SPECTRA.

178 SPARTA SPARTA COMPUTES SPATIALLY-AVERAGED DOPPLER COEFFICIENTS AND SPATIALLY-AVERAGED DOPPLER REACTIVITY CHANGES.

184 ANL THERMOS/BRT1 ANL THERMOS AND BRT1, LIKE THE ORIGINAL THERMOS CODE DEVELOPED BY H. HONECK OF BROOKHAVEN NATIONAL LABORATORY, COMPUTE THE SCALAR THERMAL NEUTRON SPECTRUM AS A FUNCTION OF POSITION IN A LATTICE BY SOLVING THE INTEGRAL TRANSPORT EQUATION WITH ISOTROPIC SCATTERING. ONE-DIMENSIONAL SLAB OR CYLINDRICAL GEOMETRY MAY BE USED. AS OUTPUT THE CODE SUPPLIES FLUX-AVERAGED VALUES OF SIGMA A, SIGMA F, NU SIGMA F, SIGMA S, AND D FOR THE CELL COMPOSITION AND THE VALUES OF SIGMA A, SIGMA F, NU SIGMA F, SIGMA S, AND SIGMA TR FOR THE ISOTOPIC CONSTITUENTS.

185 GAMTEC2 GAMTEC2 GENERATES MULTIGROUP CONSTANTS IN THE ENERGY RANGE FROM 0 TO 10 MEV FOR EITHER HOMOGENEOUS MIXTURES OR HETEROGENEOUS ARRAYS CONSISTING OF CYLINDERIZED LATTICE CELLS. THE THERMAL GROUP CONSTANTS ARE AVERAGED OVER EITHER (1) WIGNER-WILKINS LIGHT MODERATOR SPECTRUM, (2) WILKINS HEAVY MODERATOR SPECTRUM, OR (3) A MAXWELLIAN DISTRIBUTION. FOR HETEROGENEOUS ARRAYS THE SPATIAL THERMAL FLUX IS CALCULATED BY A MONOENERGETIC P3 APPROXIMATION. FOR EPITHERMAL ENERGIES, THE SLOWING-DOWN DISTRIBUTION IS DESCRIBED BY EITHER A B1 OR P1 APPROXIMATION TO THE BOLTZMANN EQUATION. RESONANCE ABSORPTION AND FISSION ARE TREATED BY THE ADLER-NORDHEIM METHOD. AN IMPROVED METHOD OVER THAT IN GAM-I FOR AVERAGING THE RESONANCE ABSORPTION CONTRIBUTION TO THE MULTIGROUP CONSTANTS IS INCLUDED. FUEL LUMPING EFFECTS ON THE FAST FISSION OF U238 AND TH232 ARE TREATED BY AN N-FLIGHT COLLISION PROBABILITY TECHNIQUE. GROUP CONSTANTS ARE PUNCHED ON CARDS IN HFN (DIFFUSION CODE) AND DTF (SN TRANSPORT CODE) FORMATS.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

195 FORTRAN FMC-N/FMC-G THE FLEXIBLE MONTE CARLO PROGRAMS FMC-N AND FMC-G WERE ORIGINALLY WRITTEN IN ASSEMBLY LANGUAGE FOR THE IBM7C4 BY GE-ANP. THESE PROGRAMS HAVE BEEN CONVERTED TO FORTRAN FOR THE CDC1604B BY PRATT AND WHITNEY. THE PROGRAMS APPLY MONTE CARLO METHODS TO SIMULATE NEUTRON AND GAMMA RAY LIFE HISTORIES, RESPECTIVELY, IN A SOURCE-SHIELD CONFIGURATION. AS THE NAMES IMPLY, THE CODES ARE DESIGNED FOR FLEXIBILITY IN THE GEOMETRICAL, MATERIAL, NUCLEAR, AND SOURCE DESCRIPTIONS OF SOURCE-SHIELD CONFIGURATIONS AND VARIANCE REDUCTION TECHNIQUES.

201 EPITHERMOS THE EPITHERMOS CODE IS A MODIFICATION OF THE THERMOS THERMAL TRANSPORT THEORY CODE OF HONECK. THE ESSENTIAL DIFFERENCE BETWEEN THE CODES IS IN THE LIBRARY PREPARATION SUBROUTINE BASK. THE EPITHERMOS CODE IS DESIGNED TO COMPUTE THE NEUTRON DENSITY ABOVE 0.7849 EV, THE MAXIMUM ENERGY OF THE USUAL THERMOS CALCULATION. EPITHERMOS COMPUTES THE SCALAR NEUTRON DENSITY AS A FUNCTION OF POSITION AND SPEED IN A ONE-DIMENSIONAL SLAB OR CYLINDRICAL SYSTEM. THE SCATTERING MODEL IS ARBITRARY IN THE THERMAL RANGE AND THE BUILT-IN FREE GAS MODEL IS USED IN THE EPITHERMAL RANGE.

202 MCS THE MCS CODE DETERMINES THE SPATIAL DISTRIBUTION OF SOME NUCLEAR REACTION FOR A GIVEN NEUTRON SOURCE IN A GIVEN CONFIGURATION OF MATERIALS. THE MONTE CARLO ESTIMATE OF THE SOLUTION CONSISTS OF PICKING A SAMPLE OF NEUTRONS FROM THE GIVEN SOURCE AND FOLLOWING EACH NEUTRON THROUGH A SEQUENCE OF SURFACE CROSSINGS AND COLLISIONS UNTIL THE NEUTRON EITHER ESCAPES OR IS NO LONGER OF INTEREST TO THE SOLUTION. THE DESIRED FLUX OR COLLISION DENSITY IS ACCUMULATED FOR EVERY NEUTRON OF THE SAMPLE, AND THE SAMPLE SIZE INCREASED UNTIL RESULTS OF SUFFICIENT STATISTICAL SIGNIFICANCE ARE OBTAINED.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

204 AGN-GAM AGN-GAM CALCULATES THE SUBGROUP FLUXES AND CURRENT TERMS FROM A SOLUTION OF THE P1 OR B1 EQUATIONS. THE P1 EQUATIONS INCORPORATE BOTH VOLUME AND SURFACE SOURCES, ALLOWING SPECTRAL CALCULATIONS IN REFLECTOR REGIONS. OTHER SPECTRAL OPTIONS ARE FLUX KNOWN, CURRENT TERM CALCULATED AND BOTH FLUX AND CURRENT TERMS KNOWN. THE AGE FOR THE MATERIAL IS OBTAINED FROM A SECOND MOMENTS CALCULATION. THE 75 SUBGROUPS USED IN THE CALCULATIONS ARE ESTABLISHED AS QUARTER LETHARGY GROUPS FROM 10 MEV TO 0.07EV. ELASTIC SCATTERING MATRICES MAINTAIN THE ENERGY-ANGLE CORRELATION BY INCLUDING BOTH P0 AND P1 TERMS. ISOTROPIC SCATTERING MATRICES ARE INCLUDED FOR INELASTIC AND (N,2N) PROCESSES. THE METHOD OF ADLER, HINMAN AND NORDHEIM IS USED TO CALCULATE RESONANCE ABSORPTION AND FISSION CROSS SECTIONS. MULTIGROUP CONSTANTS ARE GENERATED BY SPECTRAL AVERAGING OVER THE SUBGROUPS.

213 RIFF RAFF RIFF RAFF COMPUTES RESONANCE INTEGRALS FOR ABSORBERS IN A ROD IN A TWO-REGION CIRCULARIZED CELL FOR ABOVE THERMAL ENERGIES. THE FLUX DISTRIBUTION IN THE CELL IS ALSO COMPUTED AND CAN BE PRINTED. THE METHOD OF SOLUTION IS BASED UPON THE FOLLOWING ASSUMPTIONS - ISOTROPIC SCATTERING IN THE LABORATORY SYSTEM, CONSTANT TOTAL CROSS SECTION IN THE MODERATOR AND ISOTROPIC NEUTRON FLUXES ENTERING AND LEAVING THE ROD.

219 GARCL GARCL COMPUTES EFFECTIVE GROUP CROSS SECTIONS FOR THE RESOLVED RESONANCES OF A MIXTURE OF ISOTOPES IN A TWO-REGION CELL. BASIC CROSS SECTIONS INCLUDE TEMPERATURE DEPENDENCE. THE PROGRAM ALLOWS A CHOICE OF GEOMETRIES AND CAN ACCEPT AN ARBITRARY TABLE OF ESCAPE PROBABILITIES. A DANCOFF CORRECTION MAY BE USED TO ACCOUNT FOR SHADOWING EFFECTS IN A TIGHT LATTICE, AND CROSS SECTIONS MAY BE 1/V, CONSTANT, COMPUTED FROM BREIT-WIGNER RESONANCE PARAMETERS, OR GIVEN IN TABULAR FORM. THE MESH MAY BE CHOSEN AT EQUAL ENERGY OR LETHARGY INTERVALS, PROPORTIONAL TO THE NEUTRON VELOCITY, OR AS AN ARBITRAR TABLE OF VALUES.

235 GAMMA-F (NMP468) CROSS SECTIONS FOR THE PRODUCTION OF GAMMA RAYS BY NEUTRON RADIATIVE CAPTURE, BY NEUTRON INELASTIC SCATTERING, AND BY NEUTRON-INDUCED FISSIONING ARE COMPUTED AS A FUNCTION OF NEUTRON LETHARGY GROUPS AND PHOTON ENERGY GROUPS.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

237 BOUNCE BOUNCE DETERMINES THE ONE-GROUP THERMAL NEUTRON FLUX DISTRIBUTION WITHIN THE PIN BUNDLE OF A MULTIPLE-PIN FUEL ELEMENT. ALL SCATTERING WITHIN THE PINS IS CONSIDERED TO BE ISOTROPIC. ELEMENTS WITH 6, 7, 12, 13, 18, AND 19 FUEL PINS, WHERE EACH PIN IS COMPOSED OF A CENTRAL FUEL PELLET SURROUNDED BY A CLADDING MATERIAL, MAY BE TREATED. THE COOLANT REGION AROUND THE PINS IS ASSUMED TO CONTAIN A VOID.

243 AGN-SIGMA AGN-SIGMA CALCULATES THE LEGENDRE COMPONENTS OF THE MULTIGROUP TRANSFER MATRICES SIGMA(L,G TO G+N) FOR FAST NEUTRONS. REACTIONS CONSIDERED ARE ELASTIC SCATTERING, INELASTIC SCATTERING (LEVEL EXCITATION AND THE EVAPORATION MODEL), AND THE FOLLOWING FIVE DECAY MODES FOR THE (N,2N) REACTION -- A(N,N1)A*(N2)(A-1)*, 3- AND 4- BODY PHASE SPACE MODEL, EVAPORATION MODEL, AND THE CLUSTER MODEL, WHERE A* IS THE RECOIL NUCLEUS. ALL NUCLEAR LEVELS INVOLVED IN THE TRANSITIONS ARE DISCRETE. THE CODE MAY ALSO BE USED TO CALCULATE GROUP AVERAGED CROSS SECTIONS AS WELL AS TO MANIPULATE, E.G., ADD, MULTIPLY, ETC., THE OUTPUT MATRICES. THE NEUTRON SPECTRUM MAY BE A COMBINATION OF FISSION AND 1/E OR ARBITRARY INPUT DATA.

249 LASER LASER IS BASED ON MODIFIED VERSIONS OF THE SLOWING-DOWN PROGRAM MUFT AND THE THERMALIZATION TRANSPORT THEORY PROGRAM THERMOS, AND PERFORMS A CALCULATION OF THE NEUTRON SPECTRUM IN A UNIFORM LATTICE MADE UP OF CYLINDRICAL RODS, CLADDING, AND SURROUNDING MODERATOR. THE THERMAL CUTOFF IN LASER IS 1.855 EV. THE PROGRAM PERFORMS A BURNUP CALCULATION FOR THE LATTICE. THE SPATIAL DISTRIBUTION OF BURNUP WITHIN THE FUEL RODS IS EXPLICITLY CALCULATED. THE PROGRAM WILL, AT OPTION, ACCOUNT FOR ALL NON-LINEARITIES AND MUTUAL CONNECTIONS IN THE SYSTEM OF BURNUP EQUATIONS. THIS CALCULATION ACCOUNTS FOR THE VARIATION OF THE NEUTRON FLUX IN SPACE AND ENERGY DURING EACH TIME-STEP. A BUCKLING AND A BORON POISON SEARCH (CRITICALITY SEARCH) ARE PROVIDED AS OPTIONS. OUTPUT INCLUDES EDITS IN THE ENERGY RANGE ZERO LESS THAN OR EQUAL TO E LESS THAN OR EQUAL TO 0.625 EV.

257 REAX REAX CALCULATES EPITHERMAL FLUX, ACTIVITIES AND CROSS SECTIONS AS A FUNCTION OF RADIUS AND ENERGY FOR A CONSTANT TEMPERATURE FUEL ROD IMMERSED IN A HOMOGENEOUS MEDIUM.

276 AVOID AVOID COMPUTES THE EQUIVALENT DIFFUSION COEFFICIENT AND LOSS CROSS SECTION OF AN ANNULAR VOID IN A CYLINDRICAL REACTOR AND THE RADIAL FLUX DISTRIBUTION IN THE VOID.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

277 HAMMER/LITHE/HELP HAMMER PERFORMS INFINITE LATTICE, ONE-DIMENSIONAL CELL MULTIGROUP CALCULATIONS, FOLLOWED (OPTIONALLY) BY ONE-DIMENSIONAL, FEW-GROUP, MULTIREGION REACTOR CALCULATIONS WITH NEUTRON BALANCE EDITS.

279 LEOPARD/SPOTS LEOPARD IS A UNIT CELL HOMOGENIZATION AND SPECTRUM GENERATION (MUFT-SOFOCATE) PROGRAM WITH A FUEL DEPLETION OPTION.

280 MOBOT MOBOT SOLVES THE TWO-DIMENSIONAL FIXED-SOURCE DIFFUSION EQUATION FOR THE ABSORPTION AND REMOVAL MACROSCOPIC CROSS SECTIONS REQUIRED TO YIELD A SPECIFIED REACTION RATE DISTRIBUTION.

281 RABBLE/WLIB/FLAT RABBLE COMPUTES EFFECTIVE CROSS SECTIONS FOR ABOVE THERMAL ENERGIES BASED ON RESOLVED SINGLE-LEVEL RESONANCE PARAMETERS FOR INFINITE HOMOGENEOUS OR HETEROGENEOUS SYSTEMS.

285 RESQ2/RESQO/DBF1 RESQ2 CALCULATES THE RESONANCE INTEGRAL IN A TWO-DIMENSIONAL, HEXAGONAL SYSTEM CONSISTING OF FUEL, CLAD AND WATER WITH A REFLECTING BOUNDARY CONDITION.

291 HEXSCAT HEXSCAT CALCULATES P0 THROUGH P3 COMPONENTS OF THE POLYCRYSTALLINE COHERENT ELASTIC NEUTRON SCATTERING CROSS SECTION PER NUCLEUS FOR A HEXAGONAL LATTICE. THE CODE AVERAGES POINT VALUES OVER INPUT GROUP BOUNDARIES TO GIVE SMOOTHED GROUP CROSS SECTIONS.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

298 GGC4 THE GGC4 PROGRAM SOLVES THE MULTIGROUP SPECTRUM EQUATIONS WITH SPATIAL DEPENDENCE REPRESENTED BY A SINGLE POSITIVE INPUT BUCKLING. BROAD GROUP CROSS SECTIONS (SHIELDED OR UNSHIELDED) ARE PREPARED FOR DIFFUSION AND TRANSPORT CODES BY AVERAGING WITH THE CALCULATED SPECTRA OVER INPUT-DESIGNATED ENERGY LIMITS. THE CODE IS DIVIDED INTO THREE MAIN PARTS. A FAST (GAM) SECTION WHICH COVERS THE ENERGY RANGE FROM 14.9 MEV TO 0.414 EV, A THERMAL (GATHER) SECTION WHICH COVERS THE ENERGY RANGE FROM 0 TO 2.38 EV, AND A COMBINING (COMBO) SECTION WHICH COMBINES FAST AND THERMAL CROSS SECTIONS INTO SINGLE SETS. BASIC NUCLEAR DATA FOR THE FAST SECTION WHICH CONSISTS OF FINE GROUP-AVERAGED CROSS SECTIONS AND RESONANCE PARAMETERS IS READ OFF A DATA TAPE. THE FINE GROUP ABSORPTION AND FISSION CROSS SECTIONS MAY BE ADJUSTED BY PERFORMING A RESONANCE INTEGRAL CALCULATION. UTILIZING A FISSION SOURCE AND AN INPUT BUCKLING, THE CODE SOLVES THE P1, B1, B2, OR B3 APPROXIMATION TO OBTAIN THE ENERGY-DEPENDENT FAST SPECTRUM. TWO OR SIX SPATIAL MOMENTS OF THE SPECTRUM (DUE TO A PLANE SOURCE) MAY ALSO BE EVALUATED. INSTEAD OF PERFORMING A SPECTRUM CALCULATION, THE USER MAY ENTER THE LEGENDRE COMPONENTS OF THE ANGULAR FLUX DIRECTLY. FOR AS MANY INPUT-DESIGNATED BROAD GROUP STRUCTURES AS DESIRED, THE CODE CALCULATES AND SAVES (FOR THE COMBINING SECTION) SPECTRUM-WEIGHTED AVERAGES OF MICROSCOPIC AND MACROSCOPIC CROSS SECTIONS AND TRANSFER ARRAYS. SLOWING DOWN SOURCES ARE CALCULATED AND SAVED FOR USE IN THE LOWER ENERGY RANGE. GIVEN BASIC NUCLEAR DATA, THE THERMAL SECTION OF GGC4 DETERMINES A THERMAL SPECTRUM BY EITHER READING IT AS INPUT, BY CALCULATING A MAXWELLIAN SPECTRUM FOR A GIVEN TEMPERATURE, OR BY AN ITERATIVE SOLUTION OF THE P3, B0, P1, OR B1 EQUATIONS FOR AN INPUT BUCKLING. TIME MOMENTS OF THE TIME AND ENERGY-DEPENDENT DIFFUSION EQUATIONS ARE CALCULATED (AS AN OPTION) USING THE INPUT BUCKLING TO REPRESENT LEAKAGE. BROAD GROUP CROSS SECTIONS ARE PREPARED BY AVERAGING FINE GROUP CROSS SECTIONS OVER THE CALCULATED SPECTRA. BROAD GROUP STRUCTURES ARE READ AS INPUT. THE COMBINING SECTION OF GGC4 TAKES THE BROAD GROUP-AVERAGED CROSS SECTIONS FROM THE FAST AND THERMAL PORTIONS OF GGC4 AND FORMS MULTIGROUP CROSS SECTION TABLES. THESE TABLES ARE PREPARED IN STANDARD FORMATS FOR TRANSPORT OR DIFFUSION THEORY CALCULATIONS. IN ADDITION, IT IS POSSIBLE TO USE THE COMBINING SECTION TO PRODUCE MIXTURES NOT USED IN THE SPECTRUM CALCULATION OR TO COMBINE THE RESULTS OF DIFFERENT FAST AND THERMAL SECTION CALCULATIONS AND SO ON. THESE OPTIONS ARE DESCRIBED IN REFERENCE 2.

306 FCC4 FCC4 IS A MULTIPURPOSE DATA MANIPULATION CODE FOR USE IN FAST REACTOR ANALYSIS. THE CODE CAN BE USED TO - (A) COMPUTE RESONANCE-SHIELDED CROSS SECTIONS USING DATA IN THE RUSSIAN FORMAT (SHIELDING FACTORS AND INFINITE-DILUTION CROSS SECTIONS), (B) COMPUTE MULTIGROUP FUNDAMENTAL-MODE FLUX AND ADJOINT FLUX, (C) COMPUTE AND PUNCH GROUP-COLLAPSED MICROSCOPIC OR MACROSCOPIC CROSS SECTIONS IN THE DTF FORMAT, (D) COMPUTE FUEL BURNUP AT CONSTANT FLUX OR POWER DENSITY.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS

307 HWOCR-SAFE HWOCR-SAFE IS A MONTE CARLO THERMAL REACTOR ANALYSIS PROGRAM DESIGNED FOR USE WITH PROPOSED HWOCR LATTICE CONFIGURATIONS. IT IS A BENCHMARK TOOL TO CHECK MULTIGROUP DIFFUSION AND TRANSPORT CALCULATIONS AND TO EVALUATE THE EFFECT OF THEIR USE OF GEOMETRIC APPROXIMATIONS.

316 GAFGAR/P3T/PROC/TAPCOP THE PROBLEM IS TO OBTAIN VERY DETAILED NEUTRON FLUX AND CURRENT DISTRIBUTIONS AS FUNCTIONS OF ENERGY CONSIDERING EXPLICITLY THE POSSIBLE OVERLAP EFFECTS BETWEEN RESONANCES OF A RESONANCE ABSORBER AND OF MIXTURES OF RESONANCE ABSORBERS AND TO USE THESE DISTRIBUTIONS TO PREPARE GROUP-AVERAGED CROSS SECTIONS AND TRANSFER ARRAYS FOR USE IN FAST REACTOR ANALYSES.

355 MC**2 MC**2 IS USED TO CALCULATE MULTIGROUP CROSS SECTIONS USING AN EVALUATED NUCLEAR DATA FILE (ENDF) AND THESE CROSS SECTIONS ARE SUITABLE FOR DIRECT USE BY NEUTRONICS CODES WITHOUT PERFORMING ANCILLARY CALCULATIONS.

361 GLEN THE GLEN PROGRAM INTERPOLATES VALUES OF A FACTOR PROPORTIONAL TO THE SCATTERING LAW FROM THE PUNCHED OUTPUT OF THE TOR CODE (ACC ABSTRACT 360). THE DIFFERENTIAL CROSS SECTION DETERMINED FROM THESE IS INTEGRATED OVER THE SCATTERING ANGLE TO OBTAIN COEFFICIENTS OF AN EXPANSION IN LEGENDRE POLYNOMIALS OF THIS ANGLE FOR L = 0, 1, 2, 3. INTEGRATION OVER FINAL ENERGIES YIELDS VALUES OF THE TOTAL SCATTERING CROSS SECTION AND TRANSPORT CROSS SECTION. FOR EACH OF A SERIES OF ISOTOPIC COMPOSITIONS (UP TO 10 COMPOSITIONS) THE GLEN CODE CALCULATES THE DIFFUSION LENGTH AND VALUES OF THE FLUX-WEIGHTED GROUP AVERAGE MACROSCOPIC SCATTERING, ABSORPTION, FISSION, AND TRANSFER CROSS SECTIONS.

362 WELWING WELWING WAS DEVELOPED TO CALCULATE THE MATERIAL BUCKLING OF REACTOR SYSTEMS CONSISTING OF ANNULAR FUEL ELEMENTS IN HEAVY WATER AS MODERATOR FOR VARIOUS MODERATOR TO FUEL RATIOS. THE MODERATOR TO FUEL RATIO FOR THE MAXIMUM MATERIAL BUCKLING FOR THE PARTICULAR SYSTEM IS SELECTED AUTOMATICALLY AND THE CORRESPONDING MATERIAL BUCKLING IS CALCULATED.

368 FLANGE2(71-1) FLANGE2 TAKES CROSS SECTIONS, ANGULAR DISTRIBUTION, RESONANCE PARAMETER, AND THERMAL SCATTERING LAW DATA FROM ENDF/B FORMAT II OR III DATA TAPES AND PREPARES THERMAL MULTIGROUP CROSS SECTIONS AND SCATTERING MATRICES.

374 1DX 1DX IS A MULTIPURPOSE, ONE-DIMENSIONAL DIFFUSION CODE FOR GENERATING CROSS SECTIONS TO BE USED IN FAST REACTOR ANALYSES. THE CODE IS DESIGNED TO -

(A) COMPUTE AND PUNCH RESONANCE SHIELDED CROSS SECTIONS USING DATA IN THE RUSSIAN (SEE REFERENCE 2) FORMAT,

(B) COMPUTE AND PUNCH GROUP-COLLAPSED MICROSCOPIC AND/OR MACROSCOPIC CROSS SECTIONS AVERAGED OVER THE SPECTRUM IN ANY SPECIFIED ZONE, AND

(C) COMPUTE KEFF AND PERFORM CRITICALITY SEARCHES ON TIME ABSORPTION, MATERIAL CONCENTRATIONS, ZONE DIMENSIONS, AND BUCKLING USING EITHER A FLUX OR AN ADJOINT MODEL.

388 ETOX3 ETOX3 (ENDF/B TO 1DX) CALCULATES MULTIGROUP CONSTANTS FOR NUCLEAR REACTOR CALCULATIONS USING DATA FROM THE EVALUATED NUCLEAR DATA FILE (ENDF/B) VERSION II OR VERSION III FORMAT. IT CAN ALSO PROCESS VERSION I MATERIALS THAT DO NOT CALL FOR PARTIAL ENERGY DISTRIBUTION LAWS 1, 2, 4, 6, OR 8 (SEE END/F, FILE 5). THE CODE IS DESIGNED TO COMPUTE AND PUNCH -

(A) INFINITE DILUTE CROSS SECTIONS,

(B) TEMPERATURE DEPENDENT SELF-SHIELDING FACTORS FOR ARBITRARY VALUES OF MICROSCOPIC SIGMAO (TOTAL CROSS SECTION PER ATOM) IN THE RUSSIAN (BONDARENKO) FORMAT, AND

(C) INELASTIC SCATTERING PROBABILITY MATRICES.

392 RAFFLE RAFFLE CALCULATES NEUTRON FIRST FLIGHT COLLISION PROBABILITIES FOR A WIDE VARIETY OF THREE-DIMENSIONAL CELL GEOMETRY CONFIGURATIONS. THE OUTER BOUNDARIES OF THE CELL CROSS SECTION MAY BE CIRCULAR, SQUARE, OR HEXAGONAL. THE CELL MAY CONTAIN ANNULAR REGIONS AND/OR CLUSTERS OF RODS.

393 XSDRN XSDRN USES THE NORDHEIM INTEGRAL TREATMENT, NARROW RESONANCE, OR INFINITE MASS APPROXIMATION TO PROCESS RESONANCE DATA ON A MASTER CROSS SECTION LIBRARY AND THUS OBTAIN MICROSCOPIC FINE-GROUP CROSS SECTIONS FOR A LARGE NUMBER OF NUCLIDES. THE CODE WILL THEN USE THESE CROSS SECTIONS IN AN INDEPENDENT CALCULATION TO SOLVE FOR FLUXES, EIGENVALUES, CRITICAL DIMENSIONS, ETC., USING DISCRETE ORDINATES, DIFFUSION, OR AN INFINITE MEDIUM THEORY CALCULATION. THE FINE-GROUP FLUXES THUS OBTAINED CAN THEN BE USED TO COLLAPSE THE FINE-GROUP CROSS SECTION DATA TO A MORE TENABLE BROAD-GROUP STRUCTURE FOR USE IN SEVERAL INDEPENDENT COMPUTER CODES.

416 PARTI PARTI IS A GROUP COLLAPSING CODE WHICH DETERMINES THE OPTIMUM DISCRETE REPRESENTATION OF A VARIABLE FOR SUBSEQUENT REPETITIVE CALCULATIONS.

420 GROUSE GROUSE COMPUTES EFFECTIVE MULTIGROUP CROSS SECTIONS AS A FUNCTION OF POSITION IN THE CORE OF A REACTOR OR THE ABSORBER REGION OF A FUEL OR CONTROL ELEMENT. THE FLUX WEIGHTING USES SYNTHESIZED FLUXES GENERATED IN FINE ENERGY DETAIL FROM PARAMETRIC FLUX TRAVERSES SUPPLIED AS INPUT AS A FUNCTION OF THE CORE ABSORPTION AND SCATTER CROSS SECTIONS.

426 PAX03 PAX03 PERFORMS INFINITE MEDIUM, TIME-DEPENDENT CALCULATIONS OF NEUTRON FLUX SPECTRA IN HOMOGENEOUS, HYDROGENOUS MEDIA. A HARMONY FILE CONTAINING FEW-GROUP MICROSCOPIC AND/OR MACROSCOPIC CROSS SECTIONS FOR POC7 PROBLEMS MAY BE GENERATED. THE ONE-DIMENSIONAL MULTIGROUP TRANSPORT EQUATION MAY BE SOLVED USING A P1 TO P7 APPROXIMATION IN RECTANGULAR, CYLINDRICAL, OR SPHERICAL GEOMETRY. HETEROGENEOUS RESONANCE INTEGRALS AND THERMAL SHIELDING FACTORS ARE CALCULATED FOR EITHER PLATE OR ROD GEOMETRY. BLACKNESS PARAMETERS ARE CALCULATED AND COEFFICIENTS FOR TEMPERATURE FEEDBACK CALCULATIONS ARE OBTAINED. FEW-GROUP CONSTANTS ARE AVAILABLE IN BOTH THE FAST AND THERMAL ENERGY RANGES.

431 SUPERTOG SUPERTOG ACCEPTS NUCLEAR DATA IN EITHER A POINT BY POINT OR PARAMETRIC REPRESENTATION AS SPECIFIED BY ENDF/B. THIS DATA IS AVERAGED OVER EACH SPECIFIED GROUP WIDTH. THE EXPLICIT ASSUMPTION IS MADE THAT THE FLUX PER UNIT LETHARGY IS CONSTANT OR THAT A SUITABLE WEIGHT FUNCTION WILL BE SUPPLIED BY THE USER. WHEN RESONANCE DATA IS AVAILABLE, RESOLVED AND UNRESOLVED RESONANCE CONTRIBUTIONS ARE CALCULATED AND USED AS SPECIFIED BY INPUT OPTIONS. FINE GROUP CONSTANTS SUCH AS ONE-DIMENSIONAL REACTION ARRAYS (ABSORPTION, FISSION, ETC.), PN ELASTIC SCATTERING MATRICES, AND INELASTIC AND (N,2N) SCATTERING MATRICES ARE GENERATED AND PLACED ON TAPES IN FORMATS SUITABLE FOR USE BY THE GAM1 (ACC ABSTRACT 33), GAM2, ANISN, OR DOT PROGRAMS.

436 ETOM1 ETOM1 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B FORMAT AND PRODUCES DATA DECKS FOR USE IN GENERATION OF MUFT4 AND MUFT5 LIBRARIES.

437 ETOG1 TOG1 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B FORMAT AND PRODUCES DATA DECKS FOR USE IN GENERATION OF MUFT4, MUFT5, GAM1, GAM2, AND ANISN LIBRARIES.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

453 RICE THE PROGRAM CALCULATES AN ENERGY EXCHANGE MATRIX WHICH DESCRIBES THE PROBABILITY THAT A NEUTRON WITH ENERGY E WILL PRODUCE A RECOIL ATOM WITH ENERGY T IN A GIVEN MATERIAL. IN ADDITION, THE PROGRAM CAN CALCULATE THE PRIMARY RECOIL ATOM ENERGY SPECTRUM FOR A GIVEN NEUTRON SPECTRUM, THE DAMAGE CROSS SECTION FOR THE MATERIAL, AND AN OPTIMUM LOWER ENERGY LIMIT FOR USE IN COMPARING THE RELATIVE DAMAGE IN DIFFERENT REACTOR SPECTRA. THE PROGRAM ACCEPTS NEUTRON SCATTERING DATA DIRECTLY FROM THE ENDF/B LIBRARY TAPES AND, IN THE CASE OF A RESONANCE NUCLIDE, FROM A TAPE GENERATED BY THE PROGRAM SUPERTOG (ACC ABSTRACT 431).

461 EPOCH EPOCH SOLVES FOR FINE DETAIL P-1 FLUX SPECTRA IN SIMPLY BUCKLED MEDIA AND IS ABLE TO CALCULATE NEUTRON AGES FROM THE SPECTRA. IT OBTAINS NUCLEAR CROSS SECTIONS FROM THE ENDF/B LIBRARY IGNORING RESONANCE FILES AND IS MOST USEFUL FOR HIGHER ENERGIES WHERE RESONANT REACTIONS ARE WEAK OR ABSENT. THE PRESENT VERSION READS ONLY VERSION 1 ENDF/B TAPES.

466 APREX1 APREX1 COLLAPSES AND COMBINES CROSS SECTION SETS FOR MULTIGROUP TRANSPORT CALCULATIONS. IT PERFORMS GROUP COLLAPING FOR AS MANY ISOTOPES, MIXTURES AND LEGENDRE EXPANSION SETS AS DESIRED FROM THE DLC-2B LIBRARY. THE DLC-2B LIBRARY STRUCTURE EMPLOYS TENTH LETHARGY UNIT INTERVALS FROM 15 MEV TO 111 KEV AND QUARTER LETHARGY INTERVALS DOWN TO 0.414 EV. A 100TH GROUP 0.0 TO 0.414 EV IS USED AS A SINK GROUP. THE CODE ALSO DETERMINES THE BROAD GROUP INPUT SOURCE AND GENERATES AVERAGED NEUTRON VELOCITIES FOR USE WITH TRANSPORT CALCULATIONS.

467 HRG3 THE CODE COMPUTES THE SLOWING DOWN SPECTRUM OVER THE ENERGY RANGE 10 MEV TO .414 EV IN EITHER THE B1 OR P1 APPROXIMATION, USING 68 GROUPS OF NEUTRONS WITH A CONSTANT GROUP WIDTH OF DELTA U = .25. THE CALCULATED FLUX AND CURRENT SPECTRA ARE USED TO REDUCE THE ORIGINAL 68-GROUP CROSS SECTION DATA TO AVERAGE VALUES OVER AS MANY AS 33 BROAD GROUPS. OUTPUT IS PRINTED AND MAY ALSO BE PUNCHED IN FORMATS FOR INPUT TO ANY OF SEVERAL SPATIAL MULTIGROUP CODES.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

501 ENDRUN2 ENDRUN2 IS USED TO CALCULATE MULTIGROUP CONSTANTS FROM ENERGY-DEPENDENT, MICROSCOPIC CROSS SECTIONS, RESONANCE PARAMETERS, AND INELASTIC LEVEL DATA INPUT IN THE EVALUATED NUCLEAR DATA FILE (ENDF/B) FORMATS. DATA IS PROCESSED FOR ONE MATERIAL AT A TIME AND THE OUTPUT MULTIGROUP FILE INCLUDES BOTH INFINITELY-DILUTE GROUP CROSS SECTIONS AND SELF-SHIELDING, BONDARENKO-TYPE F-FACTORS SO THAT THE RESULTING GENERALIZED FILE IS INDEPENDENT OF REACTOR COMPOSITION. THE MULTIGROUP DATA MAY BE OUTPUT ON PUNCHED CARDS, A STANDARD LIBRARY TAPE, OR PLOTTED OVER ANY ENERGY RANGE.

505 TDOWN TDOWN GENERATES SPATIAL AND COMPOSITION DEPENDENT CROSS SECTION SETS FROM A BONDARENKO TYPE, GENERALIZED CROSS SECTION FILE CALLED GMUG. A TDOWN PROBLEM CAN BE A SIMPLE DESCRIPTION OF MATERIAL COMPOSITIONS WITH AN INPUT FLUX SPECTRA OR A PROBLEM CAN CONSIST OF A MULTI-REGIONAL TWO-DIMENSIONAL REACTOR DESCRIPTION WITH SEVERAL 0- OR 1-DIMENSIONAL FLUX SOLUTIONS TO PROVIDE THE FLUX FOR SPECTRAL ADJUSTMENTS OF THE CROSS SECTION SETS.

509 ETOT2 ETOT2 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B LIBRARY TAPE FORMATS I AND II AND PRODUCES DATA DECKS FOR USE IN THE GENERATION OF KATE, THERMOS (ACC ABSTRACT 184), TEMPEST (ACC ABSTRACT 50), AND LASER (ACC ABSTRACT 249) LIBRARIES.

520 PHROG PHROG GENERATES ENERGY DEPENDENT FAST NEUTRON SPECTRA AND ASSOCIATED MULTIGROUP CROSS SECTION DATA SUITABLE FOR USE IN DIFFUSION AND TRANSPORT THEORY REACTOR DESIGN ANALYSIS. THE SOLUTION UTILIZES 68 EQUAL LETHARGY GROUPS OF CROSS SECTION, SOURCE, AND LEAKAGE DATA OVER AN ENERGY RANGE EXTENDING FROM 10 MEV TO .414 EV. THESE DATA ARE THEN COALESCED INTO BROAD GROUP FORM USING THE FLUXES AND CURRENTS AS WEIGHTING FUNCTIONS.

521 SODOOL2 SODOOL2 CALCULATES THE TRANSIENT TEMPERATURES, PRESSURES, AND MECHANICAL WORK ENERGY WHEN A MOLTEN MATERIAL IS INSTANTANEOUSLY AND UNIFORMLY DISPERSED IN LIQUID SODIUM WHICH IS INITIALLY UNDER ACOUSTIC CONSTRAINT.

526 CLUP77 CLUP77 COMPUTES THE COLLISION PROBABILITIES IN A MULTI-REGION SQUARE ASSEMBLY OF CLUSTERED FUEL RODS. THE ASSEMBLY CAN BE MADE UP OF RODS OF INFINITE HEIGHT AND DIVIDED INTO RECTANGULAR PILLARS CONTAINING A NEST OF CONCENTRIC ANNULI OF DIFFERENT MATERIALS. THE OUTER BOUNDARY OF THE ASSEMBLY MAY BE TREATED AS REFLECTIVE OR A VACUUM.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

536 RAHAB LATTICE PHYSICS MODULES RAHAB IS A TWO-DIMENSIONAL, MULTIGROUP, NEUTRON INTEGRAL TRANSPORT CODE. ITS CAPABILITY INCLUDES FULL OR SUBDIVIDED ANNULAR, SQUARE AND HEXAGON REGIONS, CLUSTERS AND MULTICELL (MIXED LATTICES). THE MULTIGROUP STRUCTURE CAN INCLUDE THERMAL, EPITHERMAL, AND FAST ENERGY REGIONS. THE NUMBER OF ENERGY GROUPS IS VARIABLE FROM 1 TO 100. BUCKLING AND TIME EIGENVALUE SEARCHES ARE ALLOWED OPTIONS.

538 ETOG3 ETOG3 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN ENDF/B VERSION III FORMAT PRODUCING DATA DECKS FOR USE IN GENERATION OF MUFT4, MUFT5, GAM1, GAM2, AND ANISN LIBRARIES.

547 GAMBIT GAMBIT IS A PROGRAM THAT WAS DESIGNED TO CALCULATE MULTIGROUP NEUTRON CROSS SECTIONS IN THE HIGH ENERGY AND THE THERMAL ENERGY RANGES. IT WAS CREATED BY JOINING GAM, WHICH DOES THE HIGH ENERGY CALCULATION, AND BIT, WHICH DOES THE THERMAL CALCULATION.

565 INCITE INCITE GENERATES ENERGY-DEPENDENT THERMAL NEUTRON SPECTRA AND APPROPRIATE AVERAGE MULTI-GROUP CROSS SECTIONS USING ARBITRARY SCATTERING KERNELS. THE PHYSICAL MODEL IS A HOMOGENEOUS, CRITICAL, ONE-DIMENSIONAL BARE SLAB CORE.

572 XLACS XLACS CALCULATES FINE-GROUP AVERAGED NEUTRON CROSS SECTIONS FROM ENDF/B DATA. ITS PRIMARY PURPOSE IS TO PRODUCE FULL RANGE MULTIGROUP LIBRARIES FOR THE XSDRN PROGRAM (ACC ABSTRACT 493). PROVISIONS ARE INCLUDED FOR TREATING FAST, RESONANCE, AND THERMAL ENDF/B DATA. FINE-GROUP ENERGY STRUCTURES AND EXPANSION ORDERS USED TO REPRESENT DIFFER-ENTIAL CROSS SECTIONS FOR XSDRN CAN BE ARBITRARILY SET BY THE USER. CROSS SECTIONS CAN BE AVERAGED OVER AN ARBITRARY INPUT WEIGHTING FUNCTION OR BY ANY OF SEVERAL BUILT-IN FUNCTIONS.

B. SPECTRUM CALCULATIONS, GENERATION OF GROUP CONSTANTS, LATTICE AND CELL PROBLEMS 4/75

596 ENDFB2/GAND2/GFE2 ENDFB2 CONVERTS ENDF/B CROSS SECTION DATA FROM A CARD-IMAGE TO A BINARY TAPE FOR USE BY THE GAND2 AND/OR GFE2 CODES.

GAND2 PREPARES THE CROSS SECTIONS NEEDED FOR DETAILED COMPUTATIONS OF NEUTRON ENERGY SPECTRA IN REACTORS FROM A FILE OF BASIC NUCLEAR DATA IN THE ENDF/B VERSION II OR III FORMATS (ALSO RETAINS THE ENDF/B VERSION I CAPABILITY OF GAND).

GFE2 PREPARES 1/E OR FISSION-SPECTRUM WEIGHTED, ZERO TEMPERATURE, INFINITE DILUTION GROUP-AVERAGED CROSS SECTIONS AND SCATTERING TRANSFER ARRAYS FOR USE IN THE FAST SECTIONS OF THE GGC AND MICROX CODES FROM A FILE OF BASIC NUCLEAR DATA IN THE ENDF/B VERSION II OR III FORMATS (THE ENDF/B VERSION I FORMAT CAPABILITY OF THE ORIGINAL GFE CODE IS ALSO RETAINED).

605 GAUSS5 GAUSS5 IS USED TO DETERMINE GAMMA-RAY ENERGIES AND INTENSITIES FROM SPECTRA OBTAINED WITH A GE(LI) DETECTOR AND A MULTICHANNEL PULSE-HEIGHT ANALYSIS SYSTEM.

628 ETOT-3 ETOT-3 PROCESSES BASIC NUCLEAR INFORMATION GIVEN IN THE ENDF/B FORMAT (REFERENCE 3) AND PRODUCES DATA DECKS FOR USE IN GENERATION OF KATE, THERMOS, TEMPEST AND LASER LIBRARIES.

7 FIRN FIRN SOLVES THE TWO-DIMENSIONAL SN APPROXIMATION IN FINITE CYLINDRICAL GEOMETRY. IT IS A FORTRAN ADAPTATION OF THE LOS ALAMOS TDC PROGRAM WRITTEN BY BENGT CARLSON AND CLARENCE LEE. FIRN IS LIMITED TO A MAXIMUM OF SIX GROUPS AND THE S2, S4 OR S6 APPROXIMATION.

9 FIRE5 FIRE5 SOLVES THE ONE-DIMENSIONAL MULTIGROUP AGE-DIFFUSION EQUATIONS FOR SLAB (SYMMETRIC AND ASYMMETRIC), CYLINDER, AND SPHERE GEOMETRIES. AN EXTENSION OF THE ORIGINAL LOS ALAMOS FIRE PROGRAM WRITTEN BY F. W. BRINKLEY AND C. B. MILLS, IT CONTAINS A 34-GROUP LIBRARY OF 16 ELEMENTS. FIRE5 CAN BE USED FOR CELL CALCULATIONS WITH THE BOUNDARY CONDITION THAT THE CURRENT BE ZERO ON THE OUTER BOUNDARY. THE EFFECTIVE CROSS SECTIONS AND DIFFUSION COEFFICIENTS FOR A HOMOGENISED REGION CONSISTING OF ANY NUMBER OF NEIGHBORING REGIONS CAN ALSO BE OBTAINED, BUT ONLY FOR CYLINDRICAL GEOMETRY. FIRE5 ALSO COMPUTES THE MACROSCOPIC FLUX-WEIGHTED CROSS SECTIONS FOR COLLAPSED GROUPS IN EACH REGION.

18 2DXY THE 2DXY PROGRAM SOLVES THE HOMOGENEOUS OR INHOMOGENEOUS MULTIGROUP EQUATIONS IN X-Y GEOMETRY, USING THE SN TRANSPORT EQUATION APPROXIMATION. VACUUM, SURFACE SOURCE, OR REFLECTING BOUNDARY CONDITIONS ARE AVAILABLE AS OPTIONS. IN THE HOMOGENEOUS CASE THE USER MAY REQUEST THE COMPUTATION OF REACTIVITY, REACTOR PERIOD, CRITICAL CONCENTRATIONS OF SOME COMPOSITION, OR THE CRITICAL THICKNESS OF A ZONE.

28 FOG THE FOG PROGRAM SOLVES THE ONE-DIMENSIONAL FEW-GROUP DIFFUSION EQUATIONS IN ANY OF THREE GEOMETRIES SLAB, CYLINDER, OR SPHERE. PROVISIONS ARE MADE FOR CALCULATING THE FLUX, THE ADJOINT FLUX, AND VARIOUS CRITICALITY SEARCHES AS WELL AS A BUCKLING ITERATION AND AUTOMATIC TSCHEBYSCHEFF POLYNOMIAL COMPUTATION OF SOURCE EXTRAPOLATION FACTORS.

29 AIM6 AIM6 SOLVES THE ONE-DIMENSIONAL MULTIGROUP DIFFUSION EQUATIONS UTILIZING A MICROSCOPIC CROSS SECTION LIBRARY. ANY OF THREE GEOMETRIES ARE AVAILABLE SLAB, CYLINDER OR SPHERE. CRITICALITY SEARCHES ARE PROVIDED INCLUDING A CONCENTRATION SEARCH ON ONE OR TWO ELEMENTS. HOMOGENEOUS AND INHOMOGENEOUS PROBLEMS MAY BE SOLVED WITH A VARIETY OF BOUNDARY CONDITION OPTIONS.

30 PERT PERT IS A PERTURBATION PROGRAM DESIGNED FOR USE WITH THE AIM6 AND FOG PROGRAMS. PUNCHED CARD OUTPUT FROM THESE CODES IS USED AS INPUT TO PERT. USING CROSS SECTION DATA, FLUXES, AND ADJOINT FLUXES, THE RELATIVE CHANGE IN KEFF CAN BE CALCULATED. CROSS SECTIONS MAY BE WEIGHTED WITH THE ADJOINT FLUX AND/OR DIRECT FLUX. THE NEUTRON LIFETIME FOR THE DELAY GROUPS MAY ALSO BE DETERMINED.

32 WHIRLAWAY WHIRLAWAY SOLVES THE TWO-GROUP, THREE-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS IN X-Y-Z GEOMETRY.

39 EQUIPOISE3 EQUIPOISE3 SOLVES THE TWO-GROUP, TWO-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS IN CYLINDRICAL OR SLAB GEOMETRY.

40 2DGRAND 2DGRAND SOLVES THE FEW-GROUP, TWO-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS IN CYLINDRICAL OR SLAB GEOMETRY.

59 MIST MIST OBTAINS THE SOLUTION TO THE ONE-DIMENSIONAL BOLTZMANN EQUATION IN SLAB GEOMETRY. THE NUMERICAL APPROXIMATION USED IS A LINEAR ONE WHICH CAN BE DESCRIBED AS AN EXTENSION AND GENERALIZATION OF THE SN APPROXIMATION. THE EQUATIONS ARE FORMULATED IN TERMS OF A DOUBLE SN APPROXIMATION. THE BOUNDARY CONDITIONS FOR EACH GROUP MAY BE INDEPENDENTLY SPECIFIED AND PERMIT VERY GENERAL SPECIFICATIONS WITH RESPECT TO -

(A) PERFECT MIRROR REFLECTION OR SYMMETRY, BY INPUT OF MIRROR ALBEDOS,
(B) ANISOTROPIC DIFFUSE SOURCES, BY INPUT OF LEGENDRE POLYNOMIAL COEFFICIENTS UP TO LAMBDA = 9, OR A SHORT TABLE DESCRIBING A KNOWN ANGULAR DISTRIBUTION OF THE FLUX,
(C) ISOTROPIC (LAMBERT SURFACE) REFLECTION.

ISOTROPIC VOLUME SOURCES IN EACH GROUP MAY ALSO BE INDEPENDENTLY SPECIFIED. THE SCATTERING FROM ONE GROUP TO ANOTHER IS ASSUMED TO BE ISOTROPIC BUT THE SCATTERING FUNCTION WITHIN EACH GROUP CAN BE A SECOND-ORDER LEGENDRE POLYNOMIAL SERIES.

75 GE-HAPO-S13 PROGRAM S CONSTRUCTS BILINEARLY COUPLED TIME-VARIANT MULTIENERGY NEUTRON-AND-PHOTON TRANSPORT AND NUCLIDE-TRANSMUTATION FIELDS HAVING SLAB, CYLINDRICAL, OR SPHERICAL SYMMETRY. ASSURANCE OF UNBIASED CONVERGENCE IS PROVIDED BY USE OF A DUAL ADJOINT-AND-FLUX LOOP CONSTRUCTED IN PRECISE CORRESPONDENCE WITH THE PHYSICS OF SUCCESSIVE FREE FLIGHTS.

87 EQUIPOISE-3A EQUIPOISE-3A SOLVES THE TWO-DIMENSIONAL TWO-GROUP DIFFUSION EQUATIONS IN CYLINDRICAL OR SLAB GEOMETRY. IT IS A SLIGHTLY REVISED VERSION OF EQUIPOISE3 (ACC ABSTRACT 39). IN ADDITION TO THE STANDARD OUTPUT, A PICTURE IS PRINTED OF THE MATERIAL ARRANGEMENT IN THE REACTOR. IF THE ADJOINT FLUX OPTION IS USED, THE PROMPT NEUTRON LIFETIME IS CALCULATED AND PRINTED, WITH THE REACTIVITY PER UNIT CHANGE IN EACH GROUP CONSTANT IN EACH REGION OF THE REACTOR.

103 CRAM CRAM IS USED TO SOLVE THE MULTIGROUP DIFFUSION EQUATIONS IN TWO-DIMENSIONS (R-Z, X-Y, OR R-THETA GEOMETRY), OR IN ONE-DIMENSION (SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRY). NEUTRONS MAY SCATTER FROM ANY GROUP TO ANY OTHER. REAL, ADJOINT, AND SOURCE-TYPE PROBLEMS ARE ALL SOLVABLE. THE PROGRAM WILL COMPUTE THE K-EFFECTIVE OF THE SYSTEM OR ALTERNATIVELY SEARCH FOR CRITICALITY BY MOVING SPATIAL BOUNDARIES, VARYING MATERIAL COMPOSITIONS, OR VARYING TRANSVERSE BUCKLING.

118 ULCER ULCER IS A MULTIGROUP, ONE-DIMENSIONAL DIFFUSION EQUATION CODE WITH UPSCATTER BASED ON FAIM (ACC ABSTRACT 120). ULCER DIFFERS FROM FAIM IN THAT -

(A) UPSCATTERING IS INCLUDED,
(B) DOWNSCATTER TO ALL LOWER GROUPS,
(C) MICROSCOPIC CROSS SECTIONS ARE ON TAPE,
(D) PROVISION FOR MULTIPLE FISSION SPECTRA,
(E) RESTART DUMP,
(F) FEW-GROUP REDUCTION, AND
(G) SPECTRUM COMPUTATION AND GRAPHICAL DISPLAY.

120 FAIM/FAIMOS FAIM IS A MULTIGROUP, ONE-DIMENSIONAL DIFFUSION EQUATION PROGRAM BASED ON AIM6 (ACC ABSTRACT 29). THE PRINCIPAL FEATURES ARE -

(A) THREE GEOMETRIES,
(B) CALCULATION OF FLUXES AND MULTIPLICATION FACTOR,
(C) ONE-ITERATION PROBLEMS,
(D) CHOICE OF ONE OF FIVE SETS OF BOUNDARY CONDITIONS AT BOTH BOUNDARIES,
(E) CRITICALITY SEARCHES ON TRANSVERSE BUCKLING, HOMOGENEOUS POISON, CRITICAL RADIUS, ONE, TWO, OR THREE ELEMENT CONCENTRATION, LOCATION OF POISON REGION BOUNDARY, LOCATION OF A FUEL REGION BOUNDARY,
(F) ADJOINT FLUX CALCULATION, AND
(G) EXTENSIVE DATA EDIT.

FAIMOS IS A MODIFIED VERSION OF FAIM. THREE GENERAL MODIFICATIONS WERE MADE -

(A) THE MICROSCOPIC CROSS SECTION LIBRARY AND ITS ASSOCIATED SUBROUTINES WERE REMOVED. AS A RESULT, OPTIONS REQUIRING THE USE OF MICROSCOPIC CROSS SECTIONS ARE NOT AVAILABLE.
(B) FAIM RAN AS A CHAIN JOB. OVERLAYS ARE NOT USED BY FAIMOS.
(C) THE PROGRAM LANGUAGE WAS CONVERTED FROM FORTRAN II TO FORTRAN IV(H). THIS MODIFICATION MADE NECESSARY A MINOR CHANGE IN THE DATA INPUT FORMAT.

132 W-DSN W-DSN SOLVES THE DISCRETE SN EQUATIONS IN CYLINDRICAL GEOMETRY. THE EIGENVALUE OPTION IS REACTIVITY (KEFF) ONLY. VOLUME DISTRIBUTED SOURCES ARE ALLOWED, BUT NO SURFACE SOURCES.

136 HERESY3 HERESY3 SOLVES THE TWO-DIMENSIONAL FEW-GROUP STATIC REACTOR EIGENVALUE PROBLEM USING THE HETEROGENEOUS (SOURCE-SINK OR FFINBURG-GALANIN) FORMALISM. THE SOLUTION YIELDS THE REACTOR K EFFECTIVE AND ABSORPTION REACTION RATES FOR EACH ROD NORMALIZED TO THE MOST ABSORPTIVE ROD IN THE THERMAL LEVEL. EPITHERMAL FISSIONS ARE ALLOWED AT EACH RESONANCE LEVEL, AND LATTICE AVERAGED VALUES OF THERMAL UTILIZATION, RESONANCE ESCAPE PROBABILITY, THERMAL AND RESONANCE ETA VALUES, AND THE FAST FISSION FACTOR ARE CALCULATED. KERNELS IN THE CALCULATION ARE BASED ON AGE DIFFUSION THEORY. BOTH FINITE REACTOR LATTICES AND INFINITELY REPEATING REACTOR SUPERCELLS MAY BE CALCULATED. ROD PARAMETERS MAY BE CALCULATED BY SEVERAL INTERNAL OPTIONS, AND A DIRECT INTERFACE IS PROVIDED TO A HAMMER SYSTEM (ACC ABSTRACT 277) LATTICE LIBRARY TAPE TO OBTAIN CELL PARAMETERS. CRITICALITY SEARCHES ARE PROVIDED ON THERMAL UTILIZATION, THERMAL ETA, AND AXIAL LEAKAGE BUCKLING.

144 DTF THE DTF PROGRAM IS A ONE-DIMENSIONAL MULTIGROUP PROGRAM FOR SOLVING THE NEUTRON TRANSPORT EQUATION. THE PROGRAM CAN DETERMINE THE REGULAR OR ADJOINT SOLUTION FOR SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRY. ISOTROPIC OR A FORM OF LINEAR ANISOTROPIC SCATTERING MAY BE CONSIDERED. VARIOUS BOUNDARY CONDITIONS ARE ALLOWED SO THAT CELLS OR TIME-DEPENDENT SOLUTIONS MAY BE OBTAINED USING FINITE AS WELL AS INFINITE CONFIGURATIONS IN THE CASE OF SLABS OR CYLINDERS. THE PROGRAM ALSO CONTAINS A NUMBER OF SEARCH OPTIONS WHEREBY ONE CAN VARY DIMENSIONS OR CONCENTRATIONS TO ARRIVE AT A PREDETERMINED EIGENVALUE. DISTRIBUTED OR SHELL SOURCES MAY BE SPECIFIED AT ANY POSITION WITHIN THE CONFIGURATION. AS OUTPUT THE PROGRAM SUPPLIES THE EIGENVALUE, ANGULAR FLUXES, TOTAL FLUXES, FISSION DISTRIBUTIONS, AND OTHER QUANTITIES. A LIBRARY OF CROSS SECTIONS IS AVAILABLE ON MAGNETIC TAPE. CROSS SECTIONS MAY BE READ FROM THIS LIBRARY TAPE AND/OR FROM CARDS.

148 TOPIC TOPIC SOLVES THE ONE-DIMENSIONAL BOLTZMANN EQUATION IN CYLINDRICAL GEOMETRY WITH UP TO SIX ENERGY GROUPS, 240 SPACE POINTS, 40 REGIONS, AND ANISOTROPIC (P1) SCATTERING.
THE BOUNDARY CONDITIONS FOR EACH GROUP CAN BE INDEPENDENTLY SPECIFIED AND THE FLEXIBILITY OF THE SPECIFICATIONS PERMIT @

(A) PERFECT MIRROR REFLECTION OR SYMMETRY,
(B) ISOTROPIC REFLECTION (LAMBERT SURFACE REFLECTION), AND
(C) ANISOTROPIC DIFFUSE SOURCES BY MEANS OF EITHER A P1 LEGENDRE SERIES OR A SHORT TABLE OF POINT VALUES FOR THE ANGULAR FLUX.

INDEPENDENT SPECIFICATION OF ISOTROPIC FIXED VOLUME SOURCES FOR EACH GROUP IS ALSO ALLOWED.
AS IMPLIED, BOTH HOMOGENEOUS AND INHOMOGENEOUS PROBLEMS ARE SOLVED, AND FISSIONS CAN OCCUR IN EITHER TYPE OF PROBLEM.

151 DTF2/ANISN THE MULTIGROUP, ONE-SPACE DIMENSION NEUTRON TRANSPORT EQUATION IS SOLVED. ISOTROPIC OR LINEAR ANISOTROPIC SCATTERING IS PERMITTED BETWEEN ALL GROUPS AND A DIFFUSION SOLUTION MAY BE OBTAINED FOR ANY OR ALL GROUPS. HIGH-ORDER ANISOTROPIC SCATTERING PROBLEMS (PL) CAN BE RUN USING ANISN, THE 360 VERSION OF DTF2. WHITE/GREY BOUNDARY CONDITIONS ARE AVAILABLE, AND AN ALBEDO CAN BE SPECIFIED FOR EACH GROUP. A VOID STREAMING CORRECTION IS INCLUDED. A COMPLETE SHELL SOURCE DESCRIPTION BY GROUP, POSITION, AND ANGLE IS AVAILABLE. GRAPHICAL DISPLAY (CRT) FEATURES ARE AVAILABLE WITH ANISN.

156 EXTERMINATOR/EXTERMINATOR2 THE MULTIGROUP, TWO-DIMENSIONAL NEUTRON DIFFUSION EQUATIONS ARE SOLVED IN X-Y, R-Z, OR R-THETA GEOMETRY.

161 FORTRAN TDC TDC SOLVES THE BOLTZMANN EQUATION IN MULTIGROUP FORM FOR THE TRANSPORT OF NEUTRONS OR THE ADJOINT EQUATION IN FINITE (R,Z) CYLINDRICAL GEOMETRY BY THE DISCRETE SN METHOD. THE PROBLEM MAY BE HOMOGENEOUS (NO SOURCES INDEPENDENT OF FLUXES) OR INHOMOGENEOUS, BUT ALL SOURCES MUST BE ISOTROPIC. NEUTRON SCATTERING MUST ALSO BE ISOTROPIC. A HOMOGENEOUS PROBLEM MAY BE SOLVED FOR THE EIGENVALUE K-EFF OR THE EIGENVALUE ALPHA (TIME CONSTANT). ALTERNATIVELY, THE HOMOGENEOUS PROBLEM MAY BE SOLVED FOR THE SIZE (RADIUS, HEIGHT OR BOTH) OF THE SYSTEM CORRESPONDING TO A SPECIFIED K-EFF OR FOR THE ATOM CONCENTRATION OF SOME MATERIAL CORRESPONDING TO A SPECIFIED EIGENVALUE K-EFF OR ALPHA. FOR INHOMOGENEOUS PROBLEMS, THE IMPOSED SOURCE MAY BE AN ISOTROPIC VOLUME-DISTRIBUTED SOURCE OR AN ISOTROPIC SHELL SOURCE ON THE OUTER BOUNDARY.

167 FLARE FLARE IS AN INEXPENSIVE CALCULATIONAL METHOD TO DETERMINE CORE REACTIVITY AND CORE POWER DISTRIBUTION. A SCOPING CALCULATION OF THIS TYPE IS VALUABLE IN APPRAISING THE PHYSICS CHARACTERISTICS OF PLANNED TEST MODES OF OPERATION SO THAT DETAILED ANALYSIS CAN BE RESERVED FOR THOSE CORE CALCULATIONS OF GREATER INTEREST FROM EITHER A TECHNICIAN OR SAFETY STANDPOINT.

173 2DF 2DF IS A TWO-DIMENSIONAL MULTIGROUP PROGRAM WRITTEN IN FORTRAN FOR SOLVING THE NEUTRON TRANSPORT EQUATION USING THE SN METHOD. THE PROGRAM CAN DETERMINE THE REAL OR ADJOINT SOLUTION FOR X-Y, R-Z, OR R-THETA GEOMETRY. ISOTROPIC OR A FORM OF LINEAR ANISOTROPIC SCATTERING MAY BE CONSIDERED. VARIOUS BOUNDARY CONDITIONS ARE ALLOWED. THE PROGRAM ALSO CONTAINS A NUMBER OF SEARCH OPTIONS WHEREBY ONE CAN VARY DIMENSIONS OR CONCENTRATIONS TO ARRIVE AT A PREDETERMINED EIGENVALUE. A DISTRIBUTED SOURCE MAY BE SPECIFIED. A LIBRARY OF CROSS SECTIONS IS AVAILABLE ON MAGNETIC TAPE. CROSS SECTIONS MAY BE READ FROM THE LIBRARY TAPE AND/OR FROM CARDS.

192 2DXYL THE 2DXY PROGRAM (ACC ABSTRACT 18) HAS BEEN CONVERTED FROM FLOCO TO FORTRAN 63 FOR USE ON THE CDC1604 WITH CHANGES TO PERMIT THE INCLUSION OF FIXED SOURCE TERMS FROM TDC - TERMS REPRESENTING THE EFFECTIVE NET LOSS PER UNIT VOLUME DUE TO AXIAL LEAKAGE. IN THIS MANNER, A THREE-DIMENSIONAL FLUX SYNTHESIS CODE IS ACHIEVED.

199 TDP TDP IS A TWO-DIMENSIONAL LINEAR PERTURBATION THEORY CODE WHICH CALCULATES REACTIVITY COEFFICIENTS, PROMPT NEUTRON LIFETIMES, AND EFFECTIVE DELAYED FRACTIONS USING FLUXES FROM TDC CYLINDRICAL (R-Z) OR RECTANGULAR (X-Y) GEOMETRY.

209 DTF4 THE LINEAR, TIME-INDEPENDENT, BOLTZMANN EQUATION FOR PARTICLE TRANSPORT IS SOLVED FOR THE ENERGY SPACE, AND ANGULAR DEPENDENCE OF THE PARTICLE DISTRIBUTION IN ONE-DIMENSIONAL SLABS, CYLINDERS, AND SPHERES. INDEPENDENT SOURCE OR EIGENVALUE (MULTIPLICATION, TIME-ABSORPTION, ELEMENT CONCENTRATION, ZONE THICKNESS OR SYSTEM DIMENSION) PROBLEMS ARE SOLVED SUBJECT TO VACUUM, REFLECTIVE, OR PERIODIC BOUNDARY CONDITIONS. A COMPLETE ENERGY-TRANSFER SCATTERING MATRIX IS ALLOWED FOR EACH LEGENDRE COMPONENT OF THE SCATTERING CROSS SECTION MATRICES.

211 MGDSN, MANY GROUP DSN MGDSN IS A MODIFICATION OF DSN, THE ONE-DIMENSIONAL THEORY CODE DESIGNED TO ACCOMMODATE 100 GROUP ISOTROPIC MATERIAL CROSS SECTION DATA TAPES PREPARED BY CSP1 AND CSP2A.

212 VARI-QUIR THE TIME-DEPENDENT, MULTI-GROUP, TWO-DIMENSIONAL NEUTRON DIFFUSION EQUATIONS ARE SOLVED IN X-Y OR R-Z GEOMETRY.

220 GASP2 GASP2 CALCULATES THE ONE-DIMENSIONAL DISTRIBUTION OF FISSILE AND FERTILE MATERIALS IN A NUCLEAR REACTOR WHICH WILL YIELD ANY DESIRED POWER DISTRIBUTION AND APPROXIMATELY RETAIN THIS DESIRED POWER DISTRIBUTION DURING THE BURNUP HISTORY OF THE REACTOR CORE. A POISON AND POISON DISTRIBUTION SEARCH FOR A DESIRED MULTIPLICATION AND MINIMUM POWER DISTRIBUTION PERTURBATION CAN ALSO BE PERFORMED.

222 GAMBLE4/GAMBLE5 THE HOMOGENEOUS 2-DIMENSIONAL MULTIGROUP DIFFUSION THEORY EQUATIONS WITH ARBITRARY GROUP-TO-GROUP SCATTERING AND ARBITRARY FISSION TRANSFER ARE SOLVED FOR HETEROGENEOUS ASSEMBLIES IN X-Y AND R-Z GEOMETRY. HOMOGENEOUS LOGARITHMIC BOUNDARY CONDITIONS ARE USED AT THE OUTER SURFACE OF THE ASSEMBLY AND AT THE SURFACE OF NON-DIFFUSION REGIONS. THE RESULTS INCLUDE THE GROUP AND POINT DEPENDENT NEUTRON FLUXES, THE POWER DISTRIBUTION, THE NEUTRON MULTIPLICATION FACTOR (K-EFFECTIVE), AND A DETAILED NEUTRON BALANCE.

225 TEMCO TEMCO COMPUTES REACTOR TEMPERATURE COEFFICIENTS.

241 HFN HFN SOLVES THE HOMOGENEOUS OR INHOMOGENEOUS ONE-DIMENSIONAL MULTIGROUP DIFFUSION EQUATION FOR IT LOWEST EIGENVALUE AND THE CORRESPONDING DIRECT AND/OR ADJOINT EIGENVECTORS. INHOMOGENEOUS BOUNDARY CONDITIONS AND A FLEXIBLE SCATTER-TRANSFER MATRIX STRUCTURE ARE INCLUDED. OPTIONAL CALCULATIONS INCLUDE CRITICALITY SEARCHES, DETECTOR ACTIVATION TRAVERSES, AND INTEGRALS FOR PERTURBATION THEORY ANALYSIS.

262 MACH1 MACH1 PERFORMS ONE-DIMENSIONAL MULTIGROUP DIFFUSION SOLUTIONS AND ASSOCIATED CALCULATIONS, INCLUDING CRITICALITY SEARCHES, PERTURBATION, REACTION SUMMARY, BETA EFFECTIVE, GROUP COLLAPSING, AND POINTWISE REACTION RATES AND RATIOS. SEVERAL CARD DUMPS OF COMPUTED DATA ARE AVAILABLE ON OPTION. A SPECTRAL SYNTHESIS OPTION IS AVAILABLE IN THE IBM VERSION.

264 VARI-QUIR3 THE STEADY-STATE, MULTIGROUP, TWO-DIMENSIONAL NEUTRON DIFFUSION EQUATIONS ARE SOLVED IN X-Y, R-Z, AND R-THETA GEOMETRY.

270 CAESAR4/LIBLST CAESAR4 SOLVES THE ONE-DIMENSIONAL, MULTIGROUP DIFFUSION EQUATIONS IN ANY OF THREE GEOMETRIES AND PROVIDES A WIDE CHOICE OF BOUNDARY CONDITIONS, CRITICALITY SEARCHES, EDITS AND OTHER AUXILIARY COMPUTATIONS.

287 BISYN BISYN SOLVES THE TWO-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION EQUATIONS IN X-Y OR R-Z GEOMETRY USING A NONITERATIVE SYNTHESIS METHOD. THIS APPROACH IS DESIGNED TO GREATLY REDUCE THE COMPUTER COST OF RUNNING TWO-DIMENSIONAL MULTIGROUP PROBLEMS AT THE RISK OF SOME LOSS IN ACCURACY OF THE DETAILED FLUX DISTRIBUTION.

288 SNARG-1D THE PROGRAM IS DESIGNED TO SOLVE THE ONE-DIMENSIONAL NEUTRON TRANSPORT EQUATIONS. SNARG-1D IS WRITTEN FOR THE SOLUTION OF ONE-DIMENSIONAL PROBLEMS USING THE ORDER N = 2, 4, 6, 8, 12, 16, OR 32, AND APPLICABLE TO PLANE, CYLINDRICAL AND SPHERICAL GEOMETRIES. THE REAL OR ADJOINT SOLUTION MAY BE CALCULATED AND HOMOGENEOUS OR INHOMOGENEOUS PROBLEMS MAY BE SOLVED. FOUR CRITICALITY SEARCH OPTIONS ARE PROVIDED FOR WHICH A FIXED KEFF OR ALPHA, INVERSE PERIOD, VALUE MAY BE SPECIFIED RATHER THAN THE CRITICALITY VALUE, KEFF = 1. EITHER OF TWO INHOMOGENEOUS SOLUTIONS MAY BE OBTAINED (SHELL OR DISTRIBUTED SOURCE CALCULATIONS). LINEAR ANISOTROPIC COMPONENTS OF BOTH THE SHELL SOURCE AND THE SCATTERING CROSS SECTIONS MAY BE INCLUDED. FISSION SPECTRUM MATRICES ARE ALLOWED AS BOTH MATERIAL-DEPENDENT AND INCIDENT NEUTRON ENERGY-DEPENDENT FUNCTIONS.

304 PERT4 PERT4 COMPUTES REACTIVITY COEFFICIENT TRAVERSES IN X-Y, R-Z, OR R-THETA GEOMETRY USING THE FIRST-ORDER PERTURBATION EQUATIONS IN THE DIFFUSION APPROXIMATION. FLUX AND ADJOINT INPUT CAN BE TAKEN DIRECTLY FROM 2-D CALCULATIONS OR SYNTHESIZED FROM RADIAL AND AXIAL 1-D CALCULATIONS. THE CODE CAN ALSO BE USED TO COMPUTE ACTIVITY TRAVERSES FOR ANY CROSS SECTION OF ANY MATERIAL, THE NEUTRON GENERATION TIME, AND THE EFFECTIVE DELAYED NEUTRON FRACTION.

312 TDSN THE LINEAR, TIME-INDEPENDENT, BOLTZMANN EQUATION IS SOLVED FOR THE ENERGY, SPACE, AND ANGULAR DEPENDENCE OF THE NEUTRON DISTRIBUTION IN ONE-DIMENSIONAL SLABS, CYLINDERS OR SPHERES OR IN TWO-DIMENSIONAL X-Y OR R-Z GEOMETRY. FIXED SOURCE OR MULTIPLICATION FACTOR (ADJOINT OR FLUX) PROBLEMS ARE SOLVED SUBJECT TO VACUUM, PLANE REFLECTIVE, ISOTROPIC REFLECTIVE OR 180 DEGREE ROTATIONALLY SYMMETRIC BOUNDARY CONDITIONS. A COMPLETE ENERGY TRANSFER SCATTERING MATRIX IS ALLOWED FOR EACH LEGENDRE COMPONENT OF SCATTERING CROSS SECTION MATRICES THROUGH P1.

319 GASP7 GASP7 CALCULATES THE ONE DIMENSIONAL DISTRIBUTION OF FISSILE AND FERTILE MATERIALS IN A NUCLEAR REACTOR WHICH WILL YIELD ANY DESIRED POWER DISTRIBUTION DURING THE BURNUP HISTORY OF THE REACTOR CORE. A POISON AND POISON DISTRIBUTION SEARCH FOR A DESIRED MULTIPLICATION AND MINIMUM POWER DISTRIBUTION PERTURBATION CAN ALSO BE PERFORMED.

320 TEMCO7 TEMCO7 COMPUTES REACTOR TEMPERATURE COEFFICIENTS.

342 MO648 MO648 SOLVES THE ONE-DIMENSIONAL SLAB TRANSPORT PROBLEM WITH SLOWING DOWN FOR AN ARBITRARY SPATIAL EXTERNAL SOURCE AND ARBITRARY SCATTERING.

358 TWOTRAN2 TWOTRAN2 SOLVES THE TWO-DIMENSIONAL MULTIGROUP TRANSPORT EQUATION IN (X,Y), (R,THETA), AND (R,Z) GEOMETRIES. BOTH REGULAR AND ADJOINT, INHOMOGENEOUS AND HOMOGENEOUS (KEFF AND EIGENVALUE SEARCHES) PROBLEMS SUBJECT TO VACUUM, REFLECTIVE, PERIODIC, WHITE OR INPUT-SPECIFIED BOUNDARY FLUX CONDITIONS ARE SOLVED. GENERAL ANISOTROPIC SCATTERING IS ALLOWED AND ANISOTROPIC INHOMOGENEOUS SOURCES ARE PERMITTED.

380 GATT GATT IS A THREE-DIMENSIONAL FEW-GROUP NEUTRON DIFFUSION THEORY PROGRAM FOR CALCULATING THE DETAILED SPATIAL FLUX AND POWER DISTRIBUTION FOR REACTORS WITH HEXAGONAL CORE CONFIGURATION. THE PROGRAM USES A UNIFORM TRIANGULAR MESH IN THE HORIZONTAL MESH PLANES AND ASSUMES A RELATIVELY SIMPLE REGION STRUCTURE IN THE AXIAL DIRECTION. IT WAS DESIGNED TO REPRESENT THE SPECIAL PATCH-TYPE CORE STRUCTURE OF THE HTGR REACTOR AS CLOSELY AS POSSIBLE.

398 BE21 BE21 SOLVES THE FEW-GROUP DISCRETE ORDINATES EQUATIONS IN SLAB GEOMETRY. EITHER HOMOGENEOUS OR INHOMOGENEOUS PROBLEMS CAN BE SOLVED.

401 GAMTRI THE HOMOGENEOUS TWO-DIMENSIONAL MULTIGROUP DIFFUSION THEORY EQUATIONS WITH ARBITRARY GROUP-TO-GROUP SCATTERING AND ARBITRARY FISSION TRANSFER ARE SOLVED FOR HETEROGENEOUS ASSEMBLIES IN (UNIFORM MESH) TRIANGULAR GEOMETRY. HOMOGENEOUS LOGARITHMIC BOUNDARY CONDITIONS ARE USED AT THE OUTER SURFACE OF NON-DIFFUSION REGIONS. THE RESULTS INCLUDE THE GROUP AND POINT-DEPENDENT NEUTRON FLUXES, THE POWER DISTRIBUTION, THE NEUTRON MULTIPLICATION FACTOR, AND A DETAILED NEUTRON BALANCE.

430 GAZE2 GAZE2 IS A ONE-DIMENSIONAL, MULTIGROUP, NEUTRON DIFFUSION THEORY PROGRAM. IT INCLUDES ALL FOUR OF THE STANDARD ONE-DIMENSIONAL GEOMETRIES - SLAB, SPHERE, RADIAL CYLINDER, AND AXIAL CYLINDER, THE LAST OF WHICH IS IDENTICAL TO SLAB GEOMETRY EXCEPT WHEN THE ZOOM ALBEDO-TYPE TRANSVERSE BOUNDARY CONDITION IS USED.

450 KENO/KENO2 KENO IS A MULTIGROUP MONTE CARLO CRITICALITY CODE CONTAINING A SPECIAL GEOMETRY PACKAGE WHICH ALLOWS EASY DESCRIPTION OF SYSTEMS COMPOSED OF CYLINDERS, SPHERES, AND CUBOIDS (RECTANGULAR PARALLELEPIPEDS) ARRANGED IN ANY ORDER WITH ONLY ONE RESTRICTION (EACH GEOMETRICAL REGION MUST BE DESCRIBED AS COMPLETELY ENCLOSING ALL REGIONS INTERIOR TO IT). FOR SYSTEMS NOT DESCRIBABLE USING THIS SPECIAL GEOMETRY PACKAGE, THE PROGRAM CAN USE THE GENERALIZED GEOMETRY PACKAGE (GEOM) DEVELOPED FOR THE O5R MONTE CARLO CODE. IT ALLOWS ANY SYSTEM THAT CAN BE DESCRIBED BY A COLLECTION OF PLANES AND/OR QUADRATIC SURFACES, ARBITRARILY ORIENTED AND INTERSECTING IN ARBITRARY FASHION. RECTANGULAR ARRAYS OF FISSILE UNITS ARE ALLOWED WITH OR WITHOUT EXTERNAL REFLECTOR REGIONS. OUTPUT FROM KENO CONSISTS OF KEFF FOR THE SYSTEM PLUS AN ESTIMATE OF ITS STANDARD DEVIATION AND THE LEAKAGE, ABSORPTION, AND FISSIONS FOR EACH ENERGY GROUP PLUS THE TOTALS FOR ALL GROUPS. FLUX AS A FUNCTION OF ENERGY GROUP AND REGION AND FISSION DENSITIES AS A FUNCTION OF REGION ARE OPTIONAL OUTPUT.

459 DOT2DB DOT2DB SOLVES BOTH THE MULTIGROUP DISCRETE ORDINATES TRANSPORT THEORY AND THE MULTIGROUP DIFFUSION THEORY EQUATIONS IN TWO DIMENSIONS. ANISOTROPIC SCATTERING OF ANY ORDER LEGENDRE EXPANSION IS ALLOWED IN THE TRANSPORT THEORY OPTION. ANISOTROPIC SCATTERING IN THE DIFFUSION THEORY OPTION IS TREATED WITH THE TRANSPORT APPROXIMATION, USING THE P1 SCATTERING MATRIX, WHEN PROVIDED, TO CALCULATE THE TRANSPORT CROSS SECTION. OPTIONS INCLUDE SOLUTIONS IN (X,Y), (R,Z), (R,THETA), AND, IN THE DIFFUSION THEORY OPTION, TRIANGULAR GEOMETRIES. BOTH DIRECT AND ADJOINT FLUXES MAY BE COMPUTED FOR FIXED VOLUME-DISTRIBUTED SOURCE, MULTIPLICATION CONSTANT ITERATION, TIME ABSORPTION ITERATION, CONCENTRATION SEARCH, ZONE THICKNESS SEARCH, AND FIXED BOUNDARY SOURCE PROBLEMS. IN ADDITION TO THE FIXED BOUNDARY SOURCE PROBLEM, OPTIONS INCLUDE VACUUM, REFLECTION, PERIODIC AND WHITE BOUNDARY CONDITIONS. CROSS SECTIONS MAY BE ENTERED FROM CARDS OR FROM TAPE IN THE DTF FORMAT. ACTIVITIES FOR ANY MATERIAL IN THE SYSTEM MAY BE OUTPUT BY INTERVAL (OPTIONAL) AND ZONE. OTHER OUTPUT INCLUDES THE INTERVAL FLUXES AND SOURCES AND A REACTION SUMMARY TABLE FOR EACH ZONE AND FOR THE SYSTEM.

510 VIM1/VIM1X VIM1 IS A MONTE CARLO CODE DESIGNED FOR THE ANALYSIS OF FAST CRITICAL EXPERIMENTS. IT HAS BEEN EXPRESSLY PREPARED FOR THE ANALYSIS OF FAST CRITICAL ASSEMBLIES OF THE PLATE-DRAWER TYPE SUCH AS ZPPR, ZPR-3, AND ZEBRA. THE LIBRARY USES POINT CROSS SECTION DATA, RATHER THAN MULTIGROUP CONSTANTS.

513 TESS TESS SOLVES THE TRANSPORT EQUATION IN SLAB AND SPHERICAL GEOMETRY USING THE DOUBLE-SN APPROXIMATION FOR SLAB GEOMETRY.

523 ESP ESP IS A GENERAL-PURPOSE MONTE CARLO REACTOR ANALYSIS CODE. IT COVERS THE COMPLETE ENERGY RANGE OF INTEREST IN REACTOR CALCULATIONS AND IS DESIGNED FOR BOTH EIGENVALUE AND FIXED SOURCE REACTOR AND REACTOR CELL CALCULATIONS. BASIC DATA ARE ACCEPTED ONLY IN THE VERSION I, II, AND III ENDF/B FORMAT. IN ADDITION TO SMOOTH DATA, THE CROSS SECTION PREPARATION INCLUDES A DETAILED TREATMENT OF RESOLVED AND UNRESOLVED RESONANCES AND THE FREE GAS AND S(ALPHA,BETA) THERMAL MODELS. THE COLLISION AND SOURCE ROUTINES UTILIZE THE ENDF/B NONELASTIC SECONDARY DISTRIBUTIONS, THE ANISOTROPIC SCATTERING DATA, AND THE FISSION SPECTRA. THE ENERGY RANGE MAY BE DIVIDED INTO AS MANY AS 25,000 INTERVALS, AND OVER EACH INTERVAL THE APPROPRIATELY AVERAGED CROSS SECTIONS ARE USED AS CONSTANT POINT-ENERGY VALUES. A GENERAL THREE-DIMENSIONAL GEOMETRY DESCRIPTION IS AVAILABLE, AS WELL AS SEVERAL SPECIALIZED GEOMETRIES. USE OF FIXED-SOURCE OPTIONS ALLOWS CALCULATIONS ON NON-MULTIPLYING SYSTEMS. A STEADY-STATE ANALYSIS OF NEUTRON HISTORIES IS PERFORMED IN COMPUTER CORE FOR SUCH QUANTITIES AS NEUTRON FLUXES, REACTION RATES, AND CROSS SECTIONS, AVERAGED OVER ARBITRARY ENERGY AND SPATIAL REGIONS.

573 TWOTRAN-PNVW TWOTRAN-PNVW SOLVES TWO-DIMENSIONAL PARTICLE TRANSPORT PROBLEMS FOR X-Y, R-Z, AND R-THETA GEOMETRIES. BOTH DIRECT AND ADJOINT, HOMOGENEOUS (KEFF OR PARAMETRIC EIGENVALUE SEARCHES) OR INHOMOGENEOUS TIME-INDEPENDENT PROBLEMS ARE SOLVED SUBJECT TO VACUUM, REFLECTIVE, PERIODIC OR INPUT SPECIFICATION OF BOUNDARY FLUX CONDITIONS. BOTH ANISOTROPIC INHOMOGENEOUS PROBLEMS AND GENERAL ANISOTROPIC SCATTERING PROBLEMS ARE TREATED.

582 MONA MONA SOLVES THE MULTIGROUP, ONE-DIMENSIONAL NEUTRON DIFFUSION EQUATIONS IN SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRY FOR EITHER THE DIRECT OR ADJOINT FLUX. BOUNDARY SOURCES AND SPATIALLY DEPENDENT VOLUME SOURCES CAN BE GROUP DEPENDENT. MULTIPLE THERMAL GROUPS ARE ALLOWED.

585 TRIAL TRIAL CARRIES OUT A SIMPLE LINKING OF SEVERAL TWO-DIMENSIONAL, MULTIGROUP NEUTRON (DIRECT OR ADJOINT) FLUX SETS TO GIVE A THREE-DIMENSIONAL REPRESENTATION.

608 TRIPLET TRIPLET SOLVES THE TWO-DIMENSIONAL MULTIGROUP TRANSPORT EQUATION IN PLANAR GEOMETRIES USING A REGULAR TRIANGULAR MESH. REGULAR AND ADJOINT, INHOMOGENEOUS AND HOMOGENEOUS (KEFF AND EIGENVALUE SEARCHES) PROBLEMS SUBJECT TO VACUUM, REFLECTIVE OR SOURCE BOUNDARY CONDITIONS ARE SOLVED. GENERAL ANISOTROPIC SCATTERING IS ALLOWED AND ANISOTROPIC DISTRIBUTED SOURCES ARE PERMITTED.

617 KEFF,MGBS,TGAN THREE CODES FOR NUCLEAR CRITICALITY SAFETY EVALUATIONS MAKE UP THIS PACKAGE. THE PRINCIPAL CODES ARE A CODE FOR COMPUTING THE BUCKLING OF FISSILE MATERIAL MODERATED BY WATER (MGBS) AND A TWO-GROUP DIFFUSION THEORY CODE THAT USES PARAMETERS GENERATED BY THE BUCKLING CODE (TGAN). KEFF IS AN AUXILIARY CODE. KEFF COMPUTES KEFF FROM DIMENSIONS AND EXTRAPOLATION DISTANCES, OR ALTERNATIVE DIMENSIONS, VOLUMES, AND MASSES CORRESPONDING TO VALUES OF KEFF.

625 VARI-1D THE VARI-1D CODE CALCULATES ESTIMATES OF CHANGES IN REACTIVITY WORTHS, KEFF, REACTION RATES, POWER FRACTIONS, PROMPT-NEUTRON GENERATION TIME, DELAYED NEUTRON EFFECTIVENESS, AND FLUX INTEGRAL RATIOS DUE TO CHANGES IN NUCLEAR DATA OR COMPOSITION BY USE OF A VARIATIONAL FORMALISM. THE CODE IS APPLICABLE TO A WIDE RANGE OF REACTOR OR CRITICAL EXPERIMENT DESIGN PROBLEMS AND SENSITIVITY STUDIES.

626 ARC-DIF1D THE ARC 1D-DIFFUSION CAPABILITY PROVIDES COMPLETE ONE-DIMENSIONAL SOLUTIONS OF THE MULTIGROUP DIFFUSION EQUATIONS WITH EDITS AND A NEUTRON INVENTORY ON OPTION.

631 RAFFLE-ANC RAFFLE IS A THREE-DIMENSIONAL GENERAL-PURPOSE MONTE CARLO PROGRAM FOR THE SOLUTION OF STATIC NEUTRON TRANSPORT PROBLEMS. EITHER FISSION SOURCE ITERATION OR EXTERNAL SOURCE PROBLEMS CAN BE SOLVED. REACTION RATES AND FLUXES OR CELL-AVERAGED P0 AND P1 TRANSFER MATRICES CAN BE OBTAINED FOR UP TO 100 INPUT ENERGY GROUPS. MULTIPLICATION FACTORS, LIFETIMES, GENERATION TIMES, AND PROBABLE ERRORS ARE ALSO COMPUTED. GROUP-WISE CURRENTS FROM ANY REGION TO ADJACENT REGIONS CAN BE COMPUTED.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

55 AIMFIRE THIS PROGRAM WAS DESIGNED TO COMPARE THE COSTS OF VARIOUS FUEL CYCLES. THE PROGRAM CONTAINS A LIBRARY OF FAST AND THERMAL MICROSCOPIC CROSS SECTIONS, DECAY CONSTANTS, AND FISSION YIELDS FOR 50 ISOTOPES. THE PRESENT VERSION IS USED TO INVESTIGATE THE ECONOMICS OF URANIUM FUEL SYSTEMS.

58 SIZZLE SIZZLE SOLVES THE ONE-DIMENSIONAL, OR MULTIGROUP BURNUP PROBLEM IN THE DIFFUSION THEORY APPROXIMATION FOR FAST INTERMEDIATE REACTORS. AFTER THE INITIAL CALCULATION AT T=0, AVERAGE CROSS SECTIONS ARE COMPUTED FOR FURTHER CALCULATIONS USING ONE TO SIX ENERGY GROUPS. CRITICALITY MAY BE MAINTAINED BY USE OF A CONCENTRATION SEARCH. THE CONCENTRATION OF THE VARIOUS ISOTOPES IS PERMITTED TO VARY ONLY FROM REGION-TO-REGION. CHAINS INCLUDED ARE TH232, U238, AND A FISSION PRODUCT POISON CHAIN.

99 DUO DIMENSIONAL BURNOUT (DDB) THE FIVE-GROUP, TWO-DIMENSIONAL, NEUTRON DIFFUSION EQUATIONS IN CYLINDRICAL GEOMETRY ARE SOLVED WITH BURNOUT OPTIONS AND CONTROL ROD SEARCH OPTIONS.

117 FEVER FEVER PERFORMS ONE-DIMENSIONAL FEW-GROUP DEPLETION CALCULATIONS. OPTIONS ARE AVAILABLE TO ADJUST CONTROL POISONS IN VARIOUS REGIONS OF THE REACTOR, SELF-SHIELDING OF LUMPED POISONS, AND TO CALCULATE HOT MAXIMUM AND COLD SHUT-DOWN MULTIPLICATION.

134 NUCY THE CALCULATION OF NUCLIDE CONCENTRATIONS AT A POINT IN A REACTOR AT SUCCESSIVE TIME INTERVALS, WITH EXPOSURE TO A TWO-GROUP NEUTRON FLUX. INFINITE SYSTEM CRITICALITY IS CALCULATED.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

146 NPREFCP NUCLEAR FUEL CYCLE COSTS IN DOLLARS PER YEAR ($/YR), AND IN MILLS PER KILOWATT-HOUR (MILLS/KWHR) ARE COMPUTED AND TABULATED FOR EACH REGION OF A MULTIREGION REACTOR CORE, ON THE BASIS OF AEC-LEASED NUCLEAR FUEL MATERIAL AND OF PRIVATELY-OWNED NUCLEAR FUEL MATERIAL. FUEL CYCLE COSTS ARE COMPUTED SEPARATELY FOR EACH REGION OR ZONE, FOR CORE DESIGNS OF ANY CONFIGURATION OR COMBINATION OF MATERIAL DEPLETION OR ENRICHED URANIUM FUEL OR OTHER SPECIAL NUCLEAR MATERIAL. PRINTED OUTPUT OF THE PROGRAM INCLUDES (A) DETAILED FUEL CYCLE COSTS FOR EACH ZONE IN TABULAR FORM, FOR AEC-LEASED AND PRIVATELY-OWNED NUCLEAR FUEL MATERIAL, RESPECTIVELY, (B) A SUMMARY TABULATION OF NUCLEAR FUEL COSTS FOR ALL REGIONS OF THE COMPLETE CORE, INCLUDING FIXED CHARGES ON WORKING CAPITAL REQUIRED FOR CORE FABRICATION AND FOR NUCLEAR FUEL MATERIAL, (C) A SUMMARY TABULATION OF CERTAIN COMPUTED PERFORMANCE AND ECONOMIC DATA, VIZ., AVERAGE RESIDENCE TIME, ANNUAL FUEL THROUGHPUT, UNIT ELECTRICAL ENERGY YIELD, ANNUAL POWER GENERATION, AND CORE FABRICATION COSTS, AND (D) A TABULATION OF ALL INPUT DATA FOR ALL REGIONS. THE PRINTING OF DATA DESCRIBED IN (A) AND (D) ABOVE IS OPTIONAL WITH PROGRAM USE.

179 ISOTOPES THIS PROGRAM CAN BE USED TO CALCULATE FOR ANY NEUTRON FLUX THE OPTIMUM TIME OF IRRADIATION FOR MAXIMUM YIELD, THE SPECIFIC ACTIVITY OF THE PRODUCT ISOTOPE IN CURIES PER GRAM OF TARGET MATERIAL, AND THE COMBINED SPECIFIC ACTIVITY OF THE TARGET AND PRODUCT ISOTOPES. THE PRODUCT ISOTOPE MAY BE PRODUCED BY ANY SIMPLE REACTION SUCH AS (N,GAMMA), (N,P), (N,2N), ETC., OR IT MAY BE PRODUCED BY DECAY OF A PARENT ISOTOPE.

180 ISOCRUNCH ISOCRUNCH CAN BE USED TO COMPUTE THE AMOUNT OF EACH ISOTOPE IN A REACTION AND DECAY CHAIN FOR ANY SPECIFIED NEUTRON FLUX AND TIME, TO SUM THE CONTRIBUTIONS OF VARIOUS CHAINS TO THE SAME ISOTOPE, TO GRAPH ON AN ASSOCIATED ELECTROPLOTTER OR CALCOMP THE YIELD OF AN ISOTOPE VS. TIME FOR A GIVEN FLUX, AND TO FIND THE OPTIMUM TIME FOR MAXIMUM YIELD OF AN ISOTOPE IN A CHAIN. THE PROGRAM DOES NOT TAKE INTO ACCOUNT THE SELF-SHIELDING OF A TARGET IN A REACTOR OR THE DEPENDENCE OF REACTION CROSS SECTIONS ON NEUTRON ENERGY WHICH CAN BE HANDLED BY ADJUSTING THE INPUT DATA.

221 RELOAD FEVER A FEW-GROUP, 1-D DEPLETION CALCULATION WHICH ALLOWS FUEL IN VARIOUS STAGES OF IRRADIATION TO BE HOMOGENIZED INTO THE SAME REGION FOR PURPOSES OF THE DIFFUSION CALCULATION BUT FOLLOWS THE DEPLETION OF EACH OF THE SUB-REGIONS SEPARATELY. THE CALCULATION MAY BE INTERRUPTED PERIODICALLY FOR REFUELING ONE OR MORE REGIONS. RECYCLING IS OPTIONAL AND THERE IS NO LIMIT TO THE NUMBER OF REFUELINGS WHICH MAY BE PERFORMED. A CONTROL POISON SEARCH IS AVAILABLE AND CONCENTRATION DEPENDENT SELF-SHIELDING FACTORS MAY BE APPLIED TO ONE LUMPED POISON.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

223 REVISED GAD THIS INFINITE-MEDIUM DEPLETION PROGRAM PERFORMS FUEL CYCLE CALCULATIONS ON REACTORS EMPLOYING PARTIAL REFUELING. THE BURN-UP OF UP TO 12 DISCRETE FUEL COMPOSITIONS (REGIONS OR STAGES OF IRRADIATION) MAY BE FOLLOWED SIMULTANEOUSLY. THE BURN-UP CALCULATION MAY BE INTERRUPTED PERIODICALLY TO REMOVE THE CONTENTS AND TO REFUEL ONE OR MORE REGIONS. FUEL MAY BE PARTIALLY OR COMPLETELY RECYCLED.

224 WAMPUM THIS PROGRAM CALCULATES FUEL CYCLE COSTS ON A DETAILED BASIS, USING RESULTS OF NUCLEAR DEPLETION CALCULATIONS AND CERTAIN SPECIFIED ECONOMICS ASSUMPTIONS. THE PURPOSE IS TO PROVIDE A MEASURE OF PERFORMANCE FOR COMPARING OR OPTIMIZING FUEL CYCLES AND ASSOCIATED REACTOR CORE AND FUEL ELEMENT CHARACTERISTICS.

226 OPUS THE CODE GENERATES A FLOW NETWORK EQUIVALENT TO A GAS-COOLED NUCLEAR POWER PLANT OF SPECIFIED ELECTRICAL OUTPUT (IN THE RANGE OF 100 TO 1000 MW) ACCORDING TO INPUT DATA AND PROGRAMMED RULES, PROCEEDS TO EVALUATE THE PLANT PERFORMANCE AND PRICE OF THE TURBOGENERATOR SET (ACCORDING TO GENERAL ELECTRIC PRICE DATA), AND PRINTS AS A RESULT A CODED LIST OF ALL PLANT COMPONENTS AND A DETAILED PERFORMANCE MAP.

227 STMGEN STMGEN CAN BE USED IN A PLANT OPTIMIZATION PROGRAM. THIS CODE DETERMINES THE AREA OF EACH SECTION OF A STEAM GENERATOR REQUIRED TO SATISFY THE DESIGN CONDITIONS OF HEAT TRANSFER, PRESSURE DROP AND MAXIMUM TUBE TEMPERATURE CONSTRAINTS. THE COST OF THE GENERATOR IS COMPUTED AS A FUNCTION OF THE TOTAL HEAT TRANSFER AREA, THE NON-PRODUCTIVE TUBE LENGTH REQUIRED TO CONNECT THE HEADERS, PLUS THE COST OF THE HEADERS.

231 RAD2 THIS PROGRAM CALCULATES THE FISSION PRODUCT ACTIVITY DISTRIBUTIONS IN A HIGH TEMPERATURE GAS-COOLED REACTOR SYSTEM.

240 ASSAULT MULTIGROUP,TWO-DIMENSIONAL REACTOR DEPLETION. GIVEN NUCLIDE CONCENTRATIONS AND MICROSCOPIC CROSS SECTIONS, THE STEADY-STATE MULTIREGION, MULTIGROUP DIFFUSION EQUATIONS ARE SOLVED IN ONE OR TWO DIMENSIONS OVER A FINITE-DIFFERENCE SYSTEM OF MESH POINTS. THE CALCULATED NEUTRON FLUXES ARE THEN USED TO DETERMINE NUCLIDE CONCENTRATIONS AFTER A SPECIFIED PERIOD OF EXPOSURE. THESE CALCULATIONS ARE REPEATED FOR A SPECIFIED NUMBER OF TIME-STEPS.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS

260 GARGOYLE GARGOYLE IS AN INFINITE-MEDIUM DEPLETION CODE FOR FUEL CYCLE CALCULATIONS ON REACTORS EMPLOYING PARTIAL REFUELING. THE BURNUP OF UP TO 12 DISCRETE FUEL COMPOSITIONS (REGIONS OR STAGES OF IRRADIATION) MAY BE FOLLOWED SIMULTANEOUSLY. THE BURNUP CALCULATION MAY BE INTERRUPTED PERIODICALLY TO REMOVE THE CONTENTS OF AND TO REFUEL ONE OR MORE REGIONS. FUEL MAY BE COMPLETELY OR PARTIALLY RECYCLED. A CONTROL POISON SEARCH MAY BE PERFORMED AT EACH TIME-STEP. FEED FUEL SEARCHES ARE PERMITTED AT THE END OF EACH BURNUP CYCLE BEFORE REFUELING. CONCENTRATION DEPENDENT SELF-SHIELDING FACTORS MAY BE APPLIED TO ANY NUCLIDE EXCEPT MODERATORS. THE NUCLIDE SCHEME EMPLOYED, ALTHOUGH NOT COMPLETELY GENERAL, IS FLEXIBLE.

269 DTF-BURN DTF-BURN IS A ONE-DIMENSIONAL, MULTIGROUP BURNUP CODE BASED ON TRANSPORT THEORY. A DIFFERENT TYPE OF EIGENVALUE CALCULATION (MULTIPLICATION, PERIOD, NUCLIDE CONCENTRATION, ZONE THICKNESS, OR SYSTEM DIMENSION) CAN BE PERFORMED AT THE BEGINNING OF EACH OF A SPECIFIED SET OF TIME-STEPS. THIS FEATURE PERMITS THE SIMULATION, IN A SINGLE PROBLEM RUN, OF A SYSTEM IN WHICH VARIOUS CONTROL METHODS ARE USED AS A FUNCTION OF TIME. THE CONCENTRATION OF THE VARIOUS NUCLIDES IS PERMITTED TO VARY FROM REGION-TO-REGION OR POINT-BY-POINT. NUCLIDES CONSIDERED ARE U235, U236, U238, NP239, PU239, PU240, PU241, PU242, AND FP, A PSEUDO FISSION PRODUCT PAIR.

275 PDQ7 PDQ7 SOLVES FEW-GROUP NEUTRON DIFFUSION-DEPLETION PROBLEMS IN ONE, TWO, AND THREE DIMENSIONS. ADJOINT SOLUTIONS ARE ALSO AVAILABLE AND TWO OVERLAPPING THERMAL GROUPS MAY BE USED IN ONE AND TWO-DIMENSIONAL PROBLEMS. EITHER POINTWISE OR REGIONWISE DEPLETION MAY BE PERFORMED USING THE HARMONY DEPLETION SYSTEM. THE GEOMETRY MAY BE RECTANGULAR, CYLINDRICAL, OR SPHERICAL IN ONE DIMENSION, RECTANGULAR, CYLINDRICAL, OR HEXAGONAL IN TWO DIMENSIONS, AND RECTANGULAR OR HEXAGONAL IN THREE DIMENSIONS. ALL GEOMETRIES PROVIDE FOR VARIABLE MESH SPACING IN ALL DIMENSIONS. ZERO FLUX, ZERO CURRENT, AND ROTATIONAL SYMMETRY BOUNDARY CONDITIONS ARE AVAILABLE, AND BOUNDARY VALUE PROBLEMS MAY BE SOLVED BY SPECIFYING THE FLUX VALUES ON ONE OR MORE BOUNDARIES. THE BETTIS REVISED PDQ7 MAY BE USED TO ALSO SOLVE ADDITIVE FAST-SOURCE AND SIMPLIFIED PL PROBLEMS AS WELL AS THE THREE-DIMENSIONAL SYNTHESIS EIGENVALUE PROBLEM. CONTROL SEARCHES, THERMAL FEEDBACK, AND XENON FEEDBACK ARE OPTIONAL. THE IBM360 AND VERSION CAN BE USED TO SOLVE THREE-DIMENSIONAL SYNTHESIS PROBLEMS.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

301 FREVAP6 THE FREVAP TYPE OF CODE FOR ESTIMATING THE RELEASE OF LONGER-LIVED METALLIC FISSION PRODUCTS FROM HTGR FUEL ELEMENTS HAS BEEN DEVELOPED TO TAKE INTO ACCOUNT THE COMBINED EFFECTS OF THE RETENTION OF METALLIC FISSION PRODUCTS BY FUEL PARTICLES AND THE RATHER STRONG ABSORPTION OF THESE FISSION PRODUCTS BY THE GRAPHITE OF THE FUEL ELEMENTS. RELEASE CALCULATIONS ARE MADE ON THE BASIS THAT THE LOSS OF FISSION PRODUCT NUCLIDES SUCH AS OF STRONTIUM, CESIUM, AND BARIUM IS DETERMINED BY THEIR EVAPORATION FROM THE GRAPHITE SURFACES AND THEIR TRANSPIRATION INDUCED BY THE FLOWING HELIUM COOLANT. THE CODE IS DEVISED SO THAT CHANGES OF FISSION RATE (FUEL ELEMENT POWER), FUEL TEMPERATURE, AND GRAPHITE TEMPERATURE MAY BE INCORPORATED INTO THE CALCULATION. TEMPERATURE IS QUITE IMPORTANT IN DETERMINING RELEASE BECAUSE, IN GENERAL, BOTH RELEASE FROM FUEL PARTICLES AND LOSS BY EVAPORATION (TRANSPIRATION) VARY EXPONENTIALLY WITH THE RECIPROCAL OF THE ABSOLUTE TEMPERATURE.

302 GAFFE A ZERO-DIMENSIONAL CALCULATION OF FEED FUEL REQUIREMENTS IS PERFORMED TO PRODUCE A SPECIFIED END OF CYCLE MULTIPLICATION FACTOR FOR THE EQUILIBRIUM FUEL CYCLE, GIVEN FEED COMPOSITION, LENGTH OF CYCLE AND REACTOR POWER. IT IS ALTERNATELY POSSIBLE TO COMPUTE CYCLE LENGTH OR FEED ENRICHMENT. THE CODE IS A SURVEY TOOL WHICH ASSUMES PERIODIC REFUELING AND PERMITS COMPLETE OR PARTIAL RECYCLING OF MATERIALS. THE SEGREGATED FUEL CONCEPT CAN BE HANDLED WITHIN THE FRAMEWORK OF THE CALCULATION.

313 CINDER(M0102) CINDER IS A FOUR-GROUP, ONE-POINT DEPLETION AND FISSION PRODUCT PROGRAM BASED ON THE EVALUATION OF A GENERAL ANALYTICAL SOLUTION OF NUCLIDES COUPLED IN ANY LINEAR SEQUENCE OF RADIOACTIVE DECAYS AND NEUTRON ABSORPTIONS IN A SPECIFIED NEUTRON FLUX SPECTRUM. THE DESIRED DEPLETION AND FISSION PRODUCT CHAINS AND ALL PHYSICAL DATA ARE SPECIFIED BY THE PROBLEM ORIGINATOR. THE PROGRAM COMPUTES INDIVIDUAL NUCLIDE NUMBER DENSITIES, ACTIVITIES, NINE ENERGY-GROUP DISINTEGRATION RATES, AND MACROSCOPIC AND BARNS/FISSION POISONS AT EACH TIME-STEP AS WELL AS SELECTED SUMMARIES OF THESE DATA.

314 NAP NAP CALCULATES THE SPECTRUM AND SPATIAL DISTRIBUTION IN ONE DIMENSION OF ACTIVATION GAMMA RAYS FOLLOWING NEUTRON IRRADIATION.

318 FEVER7 FEVER7 PERFORMS A MULTIGROUP, 1-DIMENSIONAL DEPLETION CALCULATION WHICH ALLOWS FUEL IN VARIOUS STAGES OF IRRADIATION TO BE HOMOGENIZED INTO THE SAME REGION FOR PURPOSES OF THE DIFFUSION CALCULATION BUT FOLLOWS THE DEPLETION OF EACH OF THE SUBREGIONS SEPARATELY. THE CALCULATION MAY BE INTERRUPTED PERIODICALLY FOR REFUELING ONE OR MORE REGIONS. RECYCLING IS OPTIONAL AND THERE IS NO LIMIT TO THE NUMBER OF REFUELINGS WHICH MAY BE PERFORMED. A CONTROL POISON SEARCH IS AVAILABLE AND CONCENTRATION DEPENDENT SELF-SHIELDING FACTORS MAY BE APPLIED TO A NUMBER OF LUMPED POISONS.

322 ISOSEARCH THE PROGRAM WAS DEVELOPED TO CALCULATE THE UNKNOWN REACTION CROSS SECTION, FLUX VALUE, OR PRODUCT ACTIVITY IN AN ISOTOPE-PRODUCTION SCHEME CONSISTING OF TWO OR THREE NUCLIDES.

325 2DB 2DB IS A FLEXIBLE, TWO-DIMENSIONAL (X-Y, R-Z, R-THETA, HEX GEOMETRY) DIFFUSION CODE FOR USE IN FAST REACTOR ANALYSES. THE CODE CAN BE USED TO -

(A) COMPUTE FUEL BURNUP USING A FLEXIBLE MATERIAL SHUFFLING SCHEME,
(B) PERFORM CRITICALITY SEARCHES ON TIME ABSORPTION (ALPHA), MATERIAL CONCENTRATIONS, AND REGION DIMENSIONS USING A REGULAR OR ADJOINT MODEL. CRITICALITY SEARCHES CAN BE PERFORMED DURING BURNUP TO COMPENSATE FOR FUEL DEPLETION,
(C) COMPUTE FLUX DISTRIBUTIONS FOR AN ARBITRARY EXTRANEOUS SOURCE.

336 PDQ5 THE FEW-GROUP TWO-DIMENSIONAL NEUTRON DIFFUSION EQUATIONS ARE SOLVED. UP TO FIVE GROUPS MAY BE USED WITH SCATTERING ALLOWED BETWEEN ADJACENT GROUPS. IN ADDITION, DEPLETION PROBLEMS MAY BE SOLVED WITH PDQ5.

339 GAUGE THE TWO-DIMENSIONAL FEW-GROUP NEUTRON DIFFUSION THEORY EQUATIONS FOR A UNIFORM TRIANGULAR MESH ARE SOLVED TO OBTAIN THE MULTIPLICATION FACTOR AND THE SPATIAL FLUX AND POWER DISTRIBUTION OF REACTORS WITH HEXAGONAL CORE CONFIGURATION. COMPLETE REACTOR LIFE HISTORIES WITH PARTIAL REFUELLING AT A NUMBER OF RELOAD TIME POINTS CAN BE CALCULATED. AT EACH DISCRETE TIME POINT A CONTROL ROD SEARCH MAY BE PERFORMED TO MAINTAIN CRITICALITY AT ALL TIMES. THE DEPLETION SCHEME OF ALL BURNABLE NUCLIDES IS SPECIFIED BY THE USER AT EXECUTION TIME. THREE MODES OF OPERATION ARE POSSIBLE - (1) STRAIGHT BURNUP CALCULATION, (2) CONTROL ROD CRITICALITY SEARCH, ALLOWING THE ADJUSTMENT OF A NUMBER OF CONTROL ROD BANKS ACCORDING TO A PRESCRIBED ROD SEQUENCING SCHEME, AND (3) A SERIES OF STATIC CALCULATIONS WITH INSERTION OF RODS INTO FIXED PRESCRIBED POSITIONS.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

340 POWERCO POWERCO CALCULATES THE COST OF ELECTRICITY PRODUCED BY NUCLEAR POWER STATIONS, ASSUMING ALL CASH EXPENSES SUCH AS INVESTMENT AND FUEL COSTS, OPERATING EXPENSES, AND TAXES ARE KNOWN. THE POWER COST IS HELD CONSTANT THROUGHOUT THE PROJECT LIFE.

354 CINCAS CINCAS IS A NUCLEAR FUEL CYCLE COST CODE WHICH MAY BE USED FOR EITHER ENGINEERING ECONOMY PREDICTIONS OF FUEL CYCLE COSTS OR FOR ACCOUNTING FORECASTING OF SUCH COSTS. FEATURES OF CINCAS INCLUDE -

(1) MONTHLY CALCULATION OF DOLLAR COSTS AND MASS INVENTORY ON A BATCH AND CASE BASIS FOR EACH MONTH OF A PERIOD WHICH IS USUALLY DEFINED AS (BUT NOT RESTRICTED TO) BEGINNING WITH THE DELIVERY OF FUEL TO THE REACTOR SITE AND ENDING WITH THE WITHDRAWAL OF FUEL FROM THE REACTOR.

(2) A GENERAL FORMULA FOR THE UNIT PRICE OF ENRICHED URANIUM WHICH ALLOWS FOR VARIABLE FEED AND TAILS ENRICHMENTS, COSTS OF FEED, CHEMICAL CONVERSION, SEPARATIVE WORK, AND LOSSES IN CONVERSION AND FABRICATION.

367 ISOGEN ISOGEN CALCULATES RADIOISOTOPE GENERATION AND DECAY, USING TWO-GROUP NEUTRON CROSS SECTIONS.

372 RAPFU RAPFU CALCULATES EQUILIBRIUM FUEL CYCLE ISOTOPICS IN FAST BREEDER REACTORS. THE RECYCLED PLUTONIUM IS PERMITTED TO HAVE DIFFERENT ISOTOPIC COMPOSITIONS IN TWO DIFFERENT CORE ZONES, AND SEVERAL RECYCLE SCHEMES ARE AVAILABLE AS OPTIONS. OUTPUT DATA INCLUDES THE INITIAL, AVERAGE, AND DISCHARGED FUEL ISOTOPIC CONCENTRATIONS FOR EACH REGION OF THE CORE ZONES AND THE BLANKETS, BREEDING RATIO, DOUBLING TIME, AND (OPTIONALLY) FUEL COSTS CALCULATED USING SIMPLIFIED RELATIONSHIPS.

418 CHAINS CHAINS COMPUTES THE ATOM DENSITY OF MEMBERS OF A SINGLE RADIOACTIVE DECAY CHAIN. THE LINEARITY OF THE BATEMAN EQUATIONS ALLOWS TRACING OF INTERCONNECTING CHAINS BY MANUALLY ACCUMULATING RESULTS FROM SEPARATE CALCULATIONS OF SINGLE CHAINS. RE-ENTRANT LOOPS CAN BE TREATED AS EXTENSIONS OF A SINGLE CHAIN. LOSSES FROM THE CHAIN ARE ALSO TALLIED.

423 DCS DCS COMPUTES THE LOCAL NEUTRON FLUX PER REFERENCE REACTOR POWER LEVEL WHICH WILL PRODUCE THE MEASURED ACTIVITY OF A DOSIMETER. ALTERNATIVELY, IF THE FLUX VALUE IS SUPPLIED, THE CORRESPONDING DOSIMETER ACTIVITY WILL BE CALCULATED.

427 FARED FARED CONTAINS AN INTERNAL CROSS SECTION AVERAGING ROUTINE WHICH IS RESPONSIBLE FOR PREPARING BROAD GROUP CROSS SECTION SETS FOR VARIOUS MATERIAL REGIONS OF THE REACTOR. THE CROSS SECTION AVERAGING IS PERFORMED IN PROGRAM REGA, WHICH COMPUTES A B1 FLUX AND CURRENT IN UP TO 20 REACTOR BLOCK COMPOSITIONS FOR USE AS WEIGHTING FUNCTIONS IN THE CROSS SECTION COLLAPSING CALCULATION. A HOMOGENEOUS OR HETEROGENEOUS RESOLVED AND UNRESOLVED RESONANCE TREATMENT IS PROVIDED TO COMPUTE EFFECTIVE MICROGROUP RESONANCE CROSS SECTIONS FOR THE BLOCK MIXTURE OR UP TO 2 CELL TYPES PER BLOCK. REAL AND ADJOINT FLUX DISTRIBUTIONS ARE CALCULATED FOR ONE-DIMENSIONAL SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRIES. THE REAL FLUXES ARE NORMALIZED TO YIELD DESIRED TOTAL REACTOR POWER. CRITICALITY SEARCHES MAY BE PERFORMED ON THE REACTOR DIMENSION, TRANSVERSE BUCKLING OR ZONE COMPOSITIONS. ENRICHMENT SEARCHES MAY BE PERFORMED TO YIELD DESIRED RATIOS OF MAXIMUM (OR AVERAGE) POWER DENSITIES IN SEVERAL ZONES. ZONEWISE DEPLETION IS CALCULATED EITHER FOR A GIVEN TIME PERIOD OR UNTIL SPECIFIED CRITICALITY, BURNUP OR NUCLIDE CONCENTRATIONS ARE SATISFIED. FLEXIBLE FUEL MANAGEMENT IS AVAILABLE PERMITTING SPECIFIED MATERIAL UNITS TO BE MOVED INTO, OUT OF OR SHUFFLED WITHIN THE REACTOR. A WIDE VARIETY OF EDITS MAY BE PERFORMED, INCLUDING PERTURBATION AND KINETIC PARAMETERS CALCULATIONS.

438 BUG2 THE 2-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION THEORY EQUATIONS FOR X-Y OR R-Z GEOMETRY ARE SOLVED TO OBTAIN THE MULTIPLICATION FACTOR AND THE SPATIAL FLUX AND POWER DISTRIBUTIONS. COMPLETE REACTOR LIFE HISTORIES WITH PARTIAL REFUELING AT A NUMBER OF RELOAD POINTS CAN BE CALCULATED. THE DEPLETION SCHEME OF ALL BURNABLE NUCLIDES IS SPECIFIED BY THE USER AT EXECUTION TIME. A REGIONWIDE DEPLETION SCHEME IS USED. CONCENTRATION DEPENDENT SELF-SHIELDING FACTORS MAY BE APPLIED TO ANY NUCLIDE.

439 BUGTRI THE 2-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION THEORY EQUATIONS FOR TRIANGULAR GEOMETRY ARE SOLVED TO OBTAIN THE MULTIPLICATION FACTOR AND THE SPATIAL FLUX AND POWER DISTRIBUTIONS. COMPLETE REACTOR LIFE HISTORIES WITH PARTIAL REFUELING AT A NUMBER OF RELOAD TIME POINTS CAN BE CALCULATED. THE DEPLETION SCHEME OF ALL BURNABLE NUCLIDES IS SPECIFIED BY THE USER AT EXECUTION TIME. A REGIONWISE DEPLETION SCHEME IS USED. CONCENTRATION DEPENDENT SELF-SHIELDING FACTORS MAY BE APPLIED TO ANY NUCLIDE.

441 PWCOST PWCOST IS USED TO CALCULATE NUCLEAR REACTOR FUEL CYCLE COSTS. INPUT FOR ALL COMPONENTS OF THE FUEL CYCLE ARE TIME-DEPENDENT. WORKING CAPITAL CHARGE RATES MAY BE SPECIFIED SEPARATELY FOR IN-CORE AND OUT-OF-CORE TIME PERIODS.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

454 PHENIX PHENIX IS A TWO-DIMENSIONAL, MULTIGROUP, DIFFUSION-BURNUP-REFUELING CODE FOR USE WITH FAST REACTORS. THE CODE IS DESIGNED PRIMARILY FOR FUEL-CYCLE ANALYSIS OF FAST REACTORS AND CAN BE USED TO CALCULATE THE DETAILED BURNUP AND REFUELING HISTORY OF FAST BREEDER REACTOR CONCEPTS HAVING ANY GENERALIZED FRACTIONAL BATCH RELOADING SCHEME. EITHER ORDINARY KEFF CALCULATIONS OR SEARCHES ON MATERIAL CONCENTRATION OR REGION DIMENSIONS CAN BE PERFORMED AT ANY TIME DURING THE BURNUP HISTORY. THE COMPLETE FUEL CYCLE HISTORY CAN BE CALCULATED IN ONE RUN, OR THE INDIVIDUAL BURNUP INTERVALS CAN BE TREATED SEPARATELY. THE REFUELING OPTION OF THE CODE ACCOUNTS FOR THE SPATIAL FLUX SHIFTS OVER THE REACTOR LIFETIME IN THE CALCULATION OF FUEL DISCHARGE.

456 DBUFIT1 DBUFTI1 IS DESIGNED TO EXTRACT INTEGRAL CROSS SECTION INFORMATION FROM ISOTOPIC BURNUP DATA. THIS INFORMATION IS OBTAINED BY FITTING BURNUP EQUATIONS TO THE ISOTOPIC DATA USING LEAST SQUARES FITTING TECHNIQUES. BURNUP EQUATIONS FOR THE FOLLOWING TRANSMUTATION CHAINS HAVE BEEN PROGRAMMED - PU239 TO PU242, U238 TO PU242, PU242 TO CM244 AND U235 TO PU238.

463 3DDT 3DDT IS A THREE-DIMENSIONAL (X-Y-Z OR R-THETA-Z) MULTIGROUP DIFFUSION THEORY CODE FOR USE IN FAST REACTOR ANALYSIS. THE CODE CAN BE USED TO COMPUTE KEFF OR TO PERFORM CRITICALITY SEARCHES ON REACTOR COMPOSITION, TIME ABSORPTION, AND REACTOR DIMENSIONS BY EITHER THE REGULAR OR THE ADJOINT FLUX EQUATIONS. MATERIAL BURNUP AND FISSION PRODUCT BUILDUP CAN BE COMPUTED FOR SPECIFIED TIME INTERVALS, AND CRITICALITY SEARCHES CAN BE PERFORMED DURING BURNUP TO COMPENSATE FOR FUEL DEPLETION AND FISSION PRODUCT GROWTH.

477 3DXT/DEP3 THESE TWO CODES WERE DEVELOPED FOR USE WITH DETAILED REACTOR PHYSICS CALCULATIONS TO OBTAIN 3-DIMENSIONAL XENON TRANSIENT (3DXT) AND DEPLETION (DEP3) CALCULATIONS. THEY ARE WELL SUITED FOR SURVEY STUDIES AND BECAUSE THEY INCORPORATE THREE-DIMENSIONAL EFFECTS WITH THERMAL FEEDBACK AND ROD SEARCH CAPABILITIES, ARE USEFUL FOR ASSESSING SITUATIONS SUCH AS ROD MISALIGNMENTS OR FUEL LOADING AND COOLANT FLOW ASYMMETRIES WHICH ARE TIME-CONSUMING AND OFTEN IMPOSSIBLE TO DETECT WITH DETAILED 1- OR 2-DIMENSIONAL CODES.

480 FUMBLE FUMBLE COMPUTES THE FUEL BURNUP IN REACTOR OPERATIONS. THIS INCLUDES THE EVALUATION OF REACTIVITY EFFECTS, BREEDING (OR DEPLETION) AND INVENTORIES OF FUEL, AND FUEL COSTS FOR CHANGING ECONOMIC CONDITIONS AND SUPPLIED FUEL COMPOSITIONS THROUGHOUT THE REACTOR LIFETIME (OR FOR AS MANY REFUELING OPERATING INTERVALS AS DESIRED). CONSIDERABLE FLEXIBILITY IS ALLOWED IN THE SPECIFICATIONS OF REACTOR REFUELING, INCLUDING FUEL COMPOSITIONS FOR THE STARTUP REACTOR, RECYCLE SCHEMES AND FISSILE MAKEUP COMPOSITIONS FOR SUBSEQUENT CORE LOADINGS, AMOUNTS OF FUEL TO BE REPLACED IN DIFFERENT POSITIONS OF THE REACTOR AT ANY REFUELING, AND SHUFFLING OF FUEL FROM ONE PART OF THE REACTOR TO ANOTHER OR TEMPORARILY STORING FUEL DISCHARGED FROM THE REACTOR FOR LATER ADDITIONAL BURNUP. THE REFUELING SPECIFICATIONS MAY BE CHANGED FROM ONE REFUELING OPERATING INTERVAL TO ANOTHER, AS WELL AS OPERATING INTERVAL TIME, POWER RATING, AND LOAD FACTOR. FUEL COSTS MAY BE EVALUATED FOR SEVERAL DIFFERENT SETS OF COST INPUT DATA (DIFFERENT ECONOMIC ASSUMPTIONS) AND MAY BE BASED ON NET COSTS ACCRUED AND ENERGY PRODUCED BY SPENT FUEL BATCHES AND/OR ON NET COSTS INCURRED FOR ALL FUEL HELD AND ENERGY PRODUCED BY THE ENTIRE REACTOR FOR EACH OPERATING INTERVAL.

495 SYN SYN CONTAINS TWO MAJOR SEGMENTS, BISYN AND BICYCL. THE BISYN SEGMENT SOLVES THE TWO-DIMENSIONAL MULTIGROUP NEUTRON DIFFUSION THEORY EQUATIONS IN R,Z OR X,Y GEOMETRY USING A NONITERATIVE SYNTHESIS METHOD. THIS APPROACH IS DESIGNED TO GREATLY REDUCE THE COMPUTER COST OF RUNNING TWO-DIMENSIONAL MULTIGROUP PROBLEMS AT THE RISK OF SOME LOSS IN ACCURACY OF THE DETAILED FLUX DISTRIBUTION. THIS SEGMENT ALSO CONTAINS A PERTURBATION AND EFFECTIVE DELAYED NEUTRON FRACTION CALCULATION.

THE BICYCL SEGMENT USES OUTPUT FROM BISYN TO SOLVE THE ONE-GROUP NEUTRON DEPLETION EQUATIONS. BICYCL ALLOWS THE USER TO SEARCH ON MAKEUP OR RECYCLE ISOTOPIC COMPOSITIONS FOR A FIRST CYCLE OF A FIRST CORE OR FOR EQUILIBRIUM CONCENTRATIONS. IT ALSO HAS PROVISIONS FOR FUEL SHUFFLING AND THE OPTION TO CYCLE BACK TO BISYN IN ORDER TO UPDATE THE FLUXES, ONE-GROUP CROSS SECTIONS, ETC.

498 CONCEPT3 CONCEPT3 GENERATES A CAPITAL COST ESTIMATE FOR A SELECTION OF SINGLE UNIT AND MULTIPLE UNIT PWR, BWR, COAL, OIL AND GAS, STEAM-ELECTRIC POWER PLANTS WITH RUN-OF-RIVER, MECHANICAL DRAFT, OR NATURAL DRAFT COOLING SYSTEMS OF SPECIFIED ELECTRICAL OUTPUT FOR ANY OF TWENTY U. S. CITIES, A HYPOTHETICAL MIDDLETOWN, AND TWO CANADIAN CITIES, AND PRINTS AS A RESULT A DETAILED COST BREAKDOWN.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS

540 PACTOLUS/CLOTHO PACTOLUS IS A CODE FOR COMPUTING NUCLEAR POWER COSTS USING THE DISCOUNTED CASH FLOW METHOD. THE CASH FLOWS ARE GENERATED FROM INPUT UNIT COSTS, TIME SCHEDULES AND BURNUP DATA. CLOTHO CALCULATES AND COMMUNICATES TO PACTOLUS MASS FLOW DATA TO MATCH A SPECIFIED LOAD FACTOR HISTORY.

549 BIGDEAL BIGDEAL IS USED TO (1) CALCULATE THE MAXIMUM TEMPERATURES OF A SPENT YANKEE ATOMIC TYPE POWER REACTOR FUEL ASSEMBLY (36 0.305-IN. -OD BY 102-IN. - LONG STAINLESS STEEL FUEL RODS ON 0.422-IN. CENTERS) DURING SHEAR-LEACH PROCESSING, AND (2) CALCULATE PRESSURE BUILDUP WITHIN A BATCH DISSOLVER AS THE HOT FUEL IS QUENCHED BY COLD NITRIC ACID IN PREPARATION FOR AQUEOUS PROCESSING. THE FOLLOWING FIVE CASES, RELATED TO THE UNIT OPERATIONS OF SHEAR-LEACH, MAY BE INVESTIGATED - (1) FUEL SUBASSEMBLY SUSPENDED VERTICALLY IN WATER, (2) SUBASSEMBLY SUSPENDED HORIZONTALLY IN AIR, (3) SUBASSEMBLY CONTAINED WITHIN THE SHEAR FEED ENVELOPE, (4) 16 5-, 7-3/4-, OR 10-IN. ID BASKETS OF SHEARED FUEL STORED IN A 4 X 4 ARRAY ON 12-IN. CENTERS, AND (5) LEACHING OF 6 BASKETS IN A BATCH DISSOLVER.

567 3DB 3DB IS A THREE-DIMENSIONAL (X-Y-Z,R-THETA-Z,TRIANGULAR-Z) MULTIGROUP DIFFUSION CODE FOR USE IN DETAILED FAST-REACTOR CRITICALITY AND BURNUP ANALYSIS. THE CODE CAN BE USED TO -

(A) COMPUTE KEFF AND PERFORM CRITICALITY SEARCHES ON TIME ABSORPTION, REACTOR COMPOSITION, AND REACTOR DIMENSIONS BY MEANS OF EITHER A FLUX OR AN ADJOINT MODEL,
(B) COMPUTE MATERIAL BURNUP USING A FLEXIBLE MATERIAL SHUFFLING SCHEME, AND
(C) COMPUTE FLUX DISTRIBUTIONS FOR AN ARBITRARY EXTRANEOUS SOURCE.

576 GEM GEM IS USED TO PREDICT FUEL CYCLE COSTS FOR ANY TYPE NUCLEAR SYSTEM (I.E., BWR, HTGR, PWR, LMFBR, GCFR, . . .). THE CURRENT VERSION IS LIMITED TO THERMAL REACTORS. GEM IS DESIGNED FOR PRODUCTION USE BY LARGE UTILITIES WHICH HAVE SEVERAL REACTOR TYPES ON THEIR SYSTEM. GEM HAS BEEN WRITTEN SO AS TO ACCOMMODATE ALL MAJOR FUEL MANAGEMENT ACTIVITIES UNDERTAKEN BY A UTILITY -

(1) FUEL BID ANALYSIS,
(2) EVALUATION OF ACTUAL DAY TO DAY OPERATION, AND
(3) SYSTEM SIMULATION AND OPTIMIZATION STUDIES.

579 DWARF DWARF ALLOWS ONE-DIMENSIONAL SIMULATION OF REACTOR BURNUP AND XENON OSCILLATION PROBLEMS IN SLAB, CYLINDRICAL, OR SPHERICAL GEOMETRY USING A FEW-GROUP DIFFUSION THEORY MODEL.

D. DEPLETION, FUEL MANAGEMENT, COST ANALYSIS, AND REACTOR ECONOMICS 4/75

588 ORCOST ORCOST ESTIMATES DIRECT AND INDIRECT CAPITAL COSTS OF NUCLEAR AND FOSSIL-FUELED STEAM-ELECTRIC POWER PLANTS. THE COSTS ARE CALCULATED USING BASE COST MODELS WHICH ARE INCLUDED IN THE PROGRAM FOR EACH OF THE FOLLOWING TYPES OF PLANTS - PWR, BWR, COAL, GAS, AND OIL.

634 REBUS2 REBUS WAS DEVELOPED TO PERFORM FUEL CYCLE ANALYSIS OF LMFBR REACTORS. GIVEN ONE OR MORE SPECIFIED FUEL SUPPLIES FROM OUTSIDE THE SYSTEM, WITH OR WITHOUT FUEL RECYCLE, REBUS2 COMPUTES THE EQUILIBRIUM OPERATING CONDITIONS OF A FAST REACTOR WITH OR WITHOUT BURN TIME ADJUSTMENT TO A GIVEN DISCHARGE BURNUP, WITH OR WITHOUT FRESH CHARGE ENRICHMENT ADJUSTMENT TO MAINTAIN CRITICALITY, AND WITH OR WITHOUT CONTROL ADJUSTMENT AT EACH FLUX TIME NODE. THE NON-EQUILIBRIUM PROBLEM IS ALSO HANDLED, ALTHOUGH FUEL RECYCLE IS NOT ALLOWED.

121 AIREK3 AIREK3 FINDS THE NUMERICAL SOLUTION TO THE SPACE INDEPENDENT REACTOR KINETICS EQUATIONS BASED ON THE METHOD DEVELOPED BY E. R. COHEN. INPUT AND OUTPUT ARE SIMPLIFIED AND THE POWER, INVERSE PERIOD, FEEDBACKS, AND PRECURSORS ARE DISPLAYED GRAPHICALLY.

122 SNAPKIN5/SNAPKIN-5A SNAPKIN5 PROVIDES A ONE-REGION TIME-DEPENDENT CALCULATION OF POWER, ENERGY, TEMPERATURE, REACTIVITY, INVERSE PERIOD, AND HYDROGEN LOSS IN A SNAP REACTOR AFTER A PERTURBATION FROM GIVEN INITIAL CONDITIONS. SNAPKIN-5A, IN ADDITION, WEIGHTS POWER, HEAT CAPACITY, AND REACTIVITY IMPORTANCE FOR TWENTY-FIVE OR FEWER REGIONS.

135 TRAFICORPORATION, COMPLEX TRAN EXPERIMENTAL FREQUENCY RESPONSE DATA OBTAINED FROM A LINEAR DYNAMIC SYSTEM IS PROCESSED TO OBTAIN THE TRANSFER FUNCTION AS A RATIO OF TWO FREQUENCY-DEPENDENT POLYNOMIALS. THE TRANSFER FUNCTION MAY HAVE NON-MINIMUM PHASE.

163 AIROS AIROS SOLVES THE SPACE-INDEPENDENT REACTOR KINETICS EQUATIONS AND PROVIDES FOR THE DETERMINATION OF REACTIVITY BY SOLVING IN ADDITION THE DISCRETIZED EQUATIONS WHICH REPRESENT THE SPATIAL HEAT AND MASS TRANSFER MODEL FOR SEVERAL FUEL CHANNELS. IN ADDITION, VARIATION OF THE FILM COEFFICIENT WITH FLOW IS ACCOUNTED FOR AS WELL AS THE PROVISION FOR FLOW DECAY AND AFTERGLOW HEATING. SCRAMS CAN BE INITIATED BY DELAYED SIGNALS FROM INSTRUMENTS WHICH SENSE ANY QUANTITY CALCULATED, E.G., POWER, INVERSE PERIOD OR TEMPERATURE. GENERALIZED FEEDBACK EQUATIONS ARE USED TO PROVIDE FLEXIBILITY IN THE MODELS THAT REPRESENT MULTICHANNEL HEAT TRANSFER INCLUDING CONDUCTION AND CONVECTION, ENERGY, PRESSURE AND OTHER PHENOMENON. THE REACTIVITY EQUATION IS ALSO GENERALIZED. THE REACTIVITY FEEDBACK COEFFICIENTS CAN BE CONSTANT OR VARY AS THE SQUARE ROOT OR RECIPROCAL OF TEMPERATURE. FURTHERMORE ANY FEEDBACK VARIABLE CAN BE USED TO INITIATE A REACTIVITY SCRAM, EACH WITH A UNIQUE DELAY TIME.

168 INVERSE KINETICS (R102) GIVEN THE SPACE-INDEPENDENT, ONE ENERGY GROUP REACTOR KINETICS EQUATIONS AND THE INITIAL CONDITIONS, THIS PROGRAM DETERMINES THE TIME VARIATION OF REACTIVITY REQUIRED TO PRODUCE THE GIVEN INPUT OF FLUX-TIME DATA.

188 CMPXMAT A SYSTEM OR N LINEAR EQUATIONS DERIVED FROM THE LAPLACE TRANSFORM OF A SET OF LINEARIZED DIFFERENTIAL EQUATIONS IS SOLVED FOR AMPLITUDE AND PHASE ANGLE AS A FUNCTION OF FREQUENCY.

255 R101 R101 SOLVES THE SPACE-INDEPENDENT, ONE-ENERGY GROUP REACTOR KINETICS EQUATIONS TO DETERMINE THE TIME VARIATION OF NEUTRON DENSITY GIVEN SPECIFIED INITIAL CONDITIONS. ANY OF FOUR PROGRAMMED REPRESENTATIONS OF EXCESS REACTIVITY CAN BE SELECTED.

290 GASA (GENERAL ATOMIC STABILITY GASA DETERMINES THE STABILITY OF ANY PHYSICAL SYSTEM WHOSE MOTION IS DESCRIBABLE BY A SET OF FIRST-ORDER LINEAR DIFFERENTIAL EQUATIONS. IN PARTICULAR GASA EVALUATES THE STABILITY OF A REACTOR DESCRIBED BY THE LINEAR REACTOR KINETICS EQUATIONS WITH TEMPERATURE FEEDBACK, AGAINST PERTURBATIONS ABOUT ANY OPERATING POWER LEVEL. THE PROGRAM WILL ALSO CALCULATE AND PLOT THE TRANSFER FUNCTION BETWEEN ANY STATE VARIABLE OF THE SYSTEM AND A GIVEN EXTERNAL FORCING FUNCTION (SUCH AS AN EXTERNAL REACTIVITY PERTURBATION) OR ANOTHER STATE VARIABLE OF THE SYSTEM.

303 BLOOST6 BLOOST6 COMBINES A REACTOR SPACE-INDEPENDENT KINETICS CODE WITH A TWO-DIMENSIONAL HEAT TRANSFER CODE, AND A TIME-DEPENDENT SPHERICAL GEOMETRY HEAT TRANSFER ROUTINE FOR FUEL PARTICLES. THE CODE IS APPLICABLE TO PROBLEMS FOR WHICH THE SPACE-INDEPENDENT FORM OF THE REACTOR KINETICS EQUATION IS APPLICABLE.

317 GAPOTKIN GAPOTKIN IS A POINT KINETICS CODE THAT SOLVES THE SPACE-INDEPENDENT KINETICS EQUATIONS FOR A VERY GENERAL FORM OF THE REACTIVITY FUNCTION.

326 AIRCS2A AIRCS2A SOLVES THE SPACE-INDEPENDENT REACTOR KINETICS EQUATIONS AND PROVIDES FOR THE DETERMINATION OF REACTIVITY BY SOLVING IN ADDITION THE DISCRETIZED EQUATIONS THAT REPRESENT THE SPATIAL HEAT AND MASS TRANSFER MODEL FOR SEVERAL FUEL CHANNELS. IN ADDITION, VARIATION OF THE FILM COEFFICIENT WITH FLOW IS ACCOUNTED FOR ALONG WITH THE PROVISION FOR FLOW DECAY AND AFTERGLOW HEATING. SCRAMS CAN BE INITIATED BY DELAYED SIGNALS FROM INSTRUMENTS THAT SENSE ANY QUANTITY CALCULATED, E.G., POWER, INVERSE PERIOD OR TEMPERATURE. GENERALIZED FEEDBACK EQUATIONS ARE USED TO PROVIDE FLEXIBILITY IN THE MODELS THAT REPRESENT MULTICHANNEL HEAT TRANSFER INCLUDING CONDUCTION AND CONVECTION, ENERGY, PRESSURE AND OTHER PHENOMENON SUCH AS FUEL MELTING, COOLANT BOILING AND VOIDING BURN-OUT. THE REACTIVITY EQUATION IS ALSO GENERALIZED. THE REACTIVITY FEEDBACK COEFFICIENTS CAN BE CONSTANT OR VARY AS THE SQUARE ROOT OR RECIPROCAL OF TEMPERATURE. FURTHERMORE, ANY FEEDBACK VARIABLE CAN BE USED TO INITIATE A REACTIVITY SCRAM, EACH WITH A UNIQUE DELAY TIME. AN INPUT GENERATOR COMPUTES THE CONDUCTION AND CONVECTION COEFFICIENTS FOR AN N X M NODAL, MULTICHANNEL SYSTEM USING BUILT-IN TABLES OF SPECIFIC HEAT, DENSITY, CONDUCTIVITY AND VISCOSITY FOR THE COMMON FUEL, STRUCTURE AND COOLANT MATERIALS, AND PERFORMS AN INITIAL TEMPERATURE CALCULATION. THE FILM COEFFICIENTS MAY BE SPECIFIED OR CALCULATED USING LYONS EQUATION OR THE DITTUS-BOELTER EQUATION.

363 BLAST BLAST HAS BEEN DEVELOPED TO STUDY ACCIDENT CONDITIONS IN CRITICAL AND SUBCRITICAL THERMAL MULTIPLYING SYSTEMS. THE PROGRAMME COMPUTES THE TIME BEHAVIOUR OF THE THERMAL NEUTRON DENSITY AND THE SYSTEM TEMPERATURE FOLLOWING A STEP CHANGE IN REACTIVITY. THE INTEGRATED THERMAL NEUTRON DENSITY IS ALSO COMPUTED, FROM WHICH THE TOTAL NUMBER OF FISSIONS DURING AN EXCURSION MAY BE OBTAINED.

486 ANCON ANCON SOLVES THE POINT-REACTOR KINETIC EQUATIONS INCLUDING THERMAL FEEDBACK. LUMP-TYPE HEAT BALANCE EQUATIONS ARE USED TO REPRESENT THE THERMODYNAMICS, AND THE HEAT CAPACITY OF EACH LUMP CAN VARY WITH TEMPERATURE. THERMAL FEEDBACK CAN BE EITHER A LINEAR OR A NON-LINEAR FUNCTION OF LUMP TEMPERATURE, AND THE IMPRESSED REACTIVITY CAN BE EITHER A POLYNOMIAL OR SINUSOIDAL FUNCTION.

489 TRIFIDO THE CODE CALCULATES THE DECAY CONSTANT AND THE POPULATION OF THE FUNDAMENTAL PROMPT NEUTRON MODE EXTRAPOLATED TO INITIAL TIME, USING PULSED NEUTRON EXPERIMENTAL DATA. THESE DATA ARE THE RESULTING TIME PROFILE OF THE NEUTRON DENSITY OF A SUBCRITICAL MULTIPLICATIVE ASSEMBLY WHICH IS REPETITIVELY PULSED WITH SHORT BURSTS OF NEUTRONS. THE TIME PROFILE IS MEASURED WITH AN APPROPRIATE DETECTOR AND RECORDED WITH A TIME ANALYSER. WITH THE CALCULATED PARAMETERS THE CODE DETERMINES THE VALUES OF (K*BETA)/L AND REACTIVITY BY MEANS OF THE GARELIS-RUSSELL METHOD, AND REACTIVITIES USING THE GOZANI AND SJOSTRAND METHODS.

491 MOD5 MOD5 CALCULATES THE TIME- AND ENERGY-DEPENDENT EVOLUTION OF THE NEUTRON DENSITY IN HOMOGENEOUS MEDIA FOLLOWING INITIATION OF A) A MONOENERGETIC SOURCE DISTRIBUTED OVER A FINITE TIME INTERVAL, OR B) A SOURCE OF ARBITRARY SPECTRUM WITH A DELTA-FUNCTION DISTRIBUTION IN TIME. EFFECTIVELY THE CODE PRODUCES GREENS FUNCTION SOLUTIONS TO THE SLOWING-DOWN EQUATION IN DISCRETE NUMERICAL FORM. LEAKAGE IS TREATED IN THE DIFFUSION APPROXIMATION. THE PROGRAM A) CALCULATES SPECTRA AND ENERGY MOMENTS AT SELECTED TIMES FOLLOWING THE BURST OF SOURCE NEUTRONS, B) EVALUATES THE TIME-DEPENDENT NEUTRON DENSITY AND SLOWING-DOWN DENSITY AT SELECTED ENERGIES AND COMPUTES MOMENTS OF THESE DENSITIES, C) CALCULATES TIME-DEPENDENT DISTRIBUTIONS OF CAPTURE, LEAKAGE AND FIRST FISSION, AND MOMENTS OF THESE DISTRIBUTIONS, D) CALCULATES STEADY-STATE CENTRAL CORE NEUTRON FLUX AND LEAKAGE FLUX IN DETAIL AND IN GROUP-AVERAGED FORM, AND E) CALCULATES PARAMETERS SUCH AS KEFF.

558 TASK TASK SOLVES THE ONE-DIMENSIONAL MULTIGROUP FORM OF THE REACTOR KINETICS EQUATIONS, USING EITHER TRANSPORT OR DIFFUSION THEORY AND ALLOWING AN ARBITRARY NUMBER OF DELAYED NEUTRON GROUPS. THE PROGRAM CAN ALSO BE USED TO SOLVE STANDARD STATIC PROBLEMS EFFICIENTLY SUCH AS EIGENVALUE PROBLEMS, DISTRIBUTED SOURCE PROBLEMS, AND BOUNDARY SOURCE PROBLEMS. CONVERGENCE PROBLEMS ASSOCIATED WITH SOURCES IN HIGHLY MULTIPLICATIVE MEDIA ARE CIRCUMVENTED, AND SUCH PROBLEMS ARE READILY CALCULABLE.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

102 AX1 AX1 PERFORMS A COUPLED NEUTRONICS-HYDRODYNAMICS CALCULATION. GIVEN A SPHERICALLY SYMMETRIC, SUPERPROMPT CRITICAL SYSTEM, THE PROGRAM COMPUTES THE VARIATION IN TIME AND SPACE OF THE SPECIFIC ENERGY, TEMPERATURE, PRESSURE, DENSITY AND VELOCITY.

129 CONEC CONEC IS A COUPLED NEUTRONIC-ELASTICITY CODE DESIGNED FOR APPLICATION TO PULSED FAST REACTOR SYSTEMS. IT IS A ONE-DIMENSIONAL CALCULATION, CAPABLE OF DEALING WITH SOLID SPHERES OR SPHERICAL SHELLS. SPECIFICALLY, CONEC CALCULATES THE ALPHA OF A SYSTEM, THE TEMPERATURE DISTRIBUTION, THE RADIAL AND TANGENTIAL STRESS DISTRIBUTIONS, AND FROM THESE THE ACCELERATIONS, VELOCITIES, AND DISPLACEMENTS THROUGHOUT THE SYSTEM.

145 WEAK EXPLOSION PROGRAM THIS PROGRAM PERFORMS A COUPLED NEUTRONICS-HYDRODYNAMICS CALCULATION FOR A SPHERICALLY SYMMETRIC REACTOR CORE WITH A GIVEN COMPOSITION TO OBTAIN THE TIME-DEPENDENT ENERGY RELEASE THAT RESULTS FROM THE INSERTION OF REACTIVITY AT A GIVEN RATE. THE BASIC USE FOR THIS PROGRAM IS FOUND IN ANALYSIS OF FAST REACTOR CORE COLLAPSE ACCIDENTS.

153 HATCHET HATCHET IS A MAJOR MODIFICATION OF THE AX1 CODE DESIGNED TO STUDY BURST CHARACTERISTICS OF A SUPERPROMPT CRITICAL, CONCENTRIC SHELL, PULSED REACTOR. IT COMPUTES SPECIFIC ENERGY, TEMPERATURE, PRESSURE, DENSITY AND VELOCITY VARIATIONS AS A FUNCTION OF TIME AND SPACE. THE CODE ALSO COMPUTES REACTIVITY AS A FUNCTION OF INVERSE REACTOR PERIOD, POWER, THE TOTAL AND KINETIC ENERGIES, AND THE POSITION OF THE SHELLS WHICH COMPRISE THE SYSTEM.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

174 FORE/FORE2 FORE CALCULATES REACTOR POWER AND TEMPERATURES OF FUEL, COOLANT, CLAD, AND STRUCTURE AS FUNCTIONS OF TIME IN RESPONSE TO A PROGRAMMED REACTIVITY INSERTION SPECIFIED AS A SERIES OF RAMPS. TEMPERATURE PROFILES ARE COMPUTED AT SPECIFIED AXIAL POSITIONS FOR AN AVERAGE CHANNEL AND FOR THE PEAK POWER (CENTRAL) CHANNEL. THE HEAT OF FUSION ACCOMPANYING FUEL MELTING IS TAKEN INTO ACCOUNT. FEEDBACK REACTIVITY MECHANISMS THAT RESPOND TO CHANGES OF TEMPERATURES INCLUDE THE FUEL DOPPLER EFFECT AND THERMAL EXPANSION OF THE CORE (AND AXIAL BLANKET OR REFLECTOR) MATERIALS. FORE2 IS A COUPLED THERMAL HYDRAULICS-POINT KINETICS DIGITAL COMPUTER CODE DESIGNED TO CALCULATE SIGNIFICANT REACTOR PARAMETERS UNDER STEADY-STATE CONDITIONS, OR AS FUNCTIONS OF TIME DURING TRANSIENTS. THE TRANSIENTS MAY RESULT FROM A PROGRAMMED REACTIVITY INSERTION OR A POWER CHANGE. VARIABLE INLET COOLANT FLOW RATE AND TEMPERATURE ARE CONSIDERED. THE CODE CALCULATES THE REACTOR POWER, THE INDIVIDUAL REACTIVITY FEEDBACKS, AND THE TEMPERATURE OF COOLANT, CLADDING, FUEL, STRUCTURE, AND ADDITIONAL MATERIAL FOR UP TO SEVEN AXIAL POSITIONS IN THREE CHANNEL TYPES WHICH REPRESENT RADIAL ZONES OF THE REACTOR. THE HEAT OF FUSION ACCOMPANYING FUEL MELTING, THE LIQUID METAL VOIDING REACTIVITY, AND THE SPATIAL AND THE TIME VARIATION OF THE FUEL CLADDING GAP COEFFICIENT DUE TO CHANGES IN GAP SIZE ARE CONSIDERED.

191 AX-TNT AX-TNT SOLVES
(A) THE COUPLED HYDRODYNAMIC, THERMODYNAMIC AND NEUTRONIC EQUATIONS WHICH DESCRIBE A SPHERICAL, SUPER-PROMPT CRITICAL REACTOR SYSTEM DURING AN EXCURSION,
(B) THE COUPLED EQUATIONS OF MOTION, AND IDEAL GAS EQUATION OF STATE FOR THE DETONATION OF A SPHERICAL CHARGE IN A GAS.

274 WIGL2 WIGL2 IS A ONE-DIMENSIONAL TWO-GROUP SPACE-TIME DIFFUSION THEORY PROGRAM WITH ZERO, ONE, OR SIX DELAYED NEUTRON GROUPS. THE PROGRAM WILL TREAT SLAB, CYLINDRICAL, AND SPHERICAL GEOMETRIES AND INCLUDES NON-BOILING HEAT TRANSFER. IT ACCOUNTS FOR XENON FEEDBACK AND FEEDBACK EFFECTS DUE TO FUEL AND COOLANT TEMPERATURE. CONTROL ROD MOTION AND CONTROL SYSTEM FEEDBACK BASED ON TOTAL CORE POWER OR OUTLET COOLANT TEMPERATURE CAN BE SIMULATED. TRANSIENTS MAY BE EXCITED BY PRESCRIBED CHANGES IN INLET COOLANT TEMPERATURE, COOLANT FLOW RATE, OR ROD POSITION.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

293 MARS MARS PERFORMS A COUPLED NEUTRONICS-HYDRODYNAMICS CALCULATION FOR A FINITE CYLINDER CORE WITH CONCENTRIC REGIONS OF DIFFERENT COMPOSITIONS AND CHARACTERISTICS TO OBTAIN THE TIME-DEPENDENT ENERGY RELEASE THAT RESULTS FROM THE INSERTION OF REACTIVITY ACCORDING TO A PRESCRIBED PROGRAM. THE BASIC USE FOR THIS PROGRAM IS FOUND IN ANALYSIS OF FAST REACTOR CORE COLLAPSE ACCIDENTS. THE REACTIVITY CHANGES DUE TO MATERIAL DISPLACEMENT IS DETERMINED BY THE USE OF PERTURBATION THEORY AND THE PRESSURE GENERATION FOR THE HYDRODYNAMICS CALCULATION IS DETERMINED BY THE THE USE OF AN EXPONENTIAL FORM FOR THE SATURATED VAPOR PRESSURE CURVE. THE DOPPLER EFFECT IS DETERMINED BY THE USE OF A FLEXIBLE T**(-N) FORM WHERE N IS A PARAMETER THAT IS SPECIFIED AT THE TIME OF EXECUTION. THE EXTERNAL REACTIVITY INSERTION CAN BE IN THE FORM OF A STEP, A LINEAR RAMP OR A PARABOLIC RAMP, WITH A LIMIT ON THE AMOUNT OF REACTIVITY WHICH CAN BE INSERTED BEING A DEFINABLE QUANTITY. TABULATED VALUES OF THE POWER AND MATERIAL WORTH DISTRIBUTIONS ARE ACCEPTED AS INPUT. THE CHARACTERISTICS OF EACH REGION (DENSITY, SPECIFIC HEAT, DOPPLER COEFFICIENT, EQUATION OF STATE, GEOMETRIC LIMITS) ARE SPECIFIED INDEPENDENTLY FOR EACH REGION TO PROVIDE FLEXIBILITY IN THE TREATMENT OF CORES OF UNUSUAL CONFIGURATION. THE NEUTRON KINETICS CALCULATIONS ARE DONE WITH A POINT REACTOR MODEL AND DELAYED NEUTRONS ARE USED.

309 TSN THE TIME-DEPENDENT NEUTRON TRANSPORT EQUATION IS SOLVED. ENERGY DEPOSITION IS ALLOWED TO CAUSE VARIATION IN THE NEUTRON CROSS SECTIONS FOR THE CORE REGION, IN THE CORE DENSITY, AND IN CORE HEIGHT. THE RESULT IS A KINETICS CALCULATION INCLUDING SPATIAL DEPENDENCE BOTH IN FEEDBACK EFFECTS AND IN NEUTRON DENSITY. THE RESULTS ARE SUMMARIZED IN A MANNER SIMILAR TO POINT-KINETICS CODES, AND SPATIAL DISTRIBUTIONS ARE ALSO GIVEN. GRAPHICAL SUMMARIES OF THE SIGNIFICANT VARIABLES AND SPATIAL DISTRIBUTIONS ARE GIVEN. IN THE IBM360 VERSION, EITHER THE NEUTRON YIELD FROM FISSION OR THE THICKNESS OF A SPECIFIED ZONE CAN BE CHANGED AS AN INDEPENDENT FUNCTION OF TIME AS SPECIFIED BY THE USER. THIS PROVIDES TWO WAYS OF ALLOWING EXPLICIT REACTIVITY VARIATION WITH TIME.

310 GAKIN2 GAKIN2 SOLVES THE TIME-DEPENDENT MULTIGROUP NEUTRON DIFFUSION EQUATIONS IN ONE SPACE DIMENSION.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

338 TWIGL/TWIGGLE TWIGL SOLVES THE TWO-DIMENSIONAL, TWO-GROUP, SPACE-TIME NEUTRON DIFFUSION EQUATIONS IN RECTANGULAR OR CYLINDRICAL GEOMETRY IN THE PRESENCE OF TEMPERATURE FEEDBACK. THE NEUTRON DIFFUSION AND DELAYED PRECURSOR EQUATIONS ARE DIFFERENCED IN BOTH SPACE AND TIME. THE THERMAL-HYDRAULIC DESCRIPTION IS BASED ON A NO-BOILING, ONE-PASS MODEL FORMULATED IN TERMS OF REGIONWISE-AVERAGED COOLANT AND FUEL METAL TEMPERATURES.

352 RAUMZEIT RAUMZEIT SOLVES SYSTEMS OF ONE-DIMENSIONAL, TIME-DEPENDENT, MULTIGROUP DIFFUSION-TYPE EQUATIONS USING EITHER OF TWO TREATMENTS OF THE TIME DEPENDENCE, FINITE DIFFERENCING OR THE TIME-INTEGRATED APPROACH (SEE REFERENCE 2).

370 GAKIT GAKIT SOLVES THE MULTIGROUP, ONE-DIMENSIONAL, TIME-DEPENDENT DIFFUSION THEORY KINETICS EQUATIONS INCLUDING DELAYED NEUTRON EFFECTS AND TEMPERATURE FEEDBACK BASED ON TWO-DIMENSIONAL HEAT TRANSFER CALCULATIONS. FOR THE ONE-DIMENSIONAL MULTIGROUP KINETICS EQUATIONS AN ARBITRARY SCATTERING MATRIX AND ARBITRARY FISSION TRANSFER ARE ALLOWED, AND PLANE, CYLINDRICAL, OR SPHERICAL GEOMETRY MIGHT BE USED. A PIECEWISE LINEAR TIME-DEPENDENT INHOMOGENEOUS SOURCE CAN BE SPECIFIED. FEEDBACK IS AVAILABLE FROM XENON BUILDUP AND TEMPERATURE DEPENDENCE OF CROSS SECTIONS. THE HEAT TRANSFER CALCULATION IS PERFORMED FOR TWO-DIMENSIONAL R-Z FUEL ELEMENT MODELS ASSUMING PREDETERMINED AXIAL POWER SHAPE FUNCTIONS AND TIME-DEPENDENT POWER AMPLITUDES OBTAINED FROM THE ONE-DIMENSIONAL KINETICS CALCULATIONS. FOR THE FUEL ELEMENTS AVERAGE FUEL AND MODERATOR TEMPERATURES ARE CALCULATED WHICH DETERMINE, BASED ON TABLES, THE TEMPERATURE-DEPENDENT CROSS SECTIONS. TRANSIENTS MAY BE INTRODUCED BY STEP CHANGES OF CROSS SECTIONS, BY PIECEWISE LINEAR TIME-DEPENDENT CROSS SECTIONS (ROD WITHDRAWAL ACCIDENTS), BY STEP CHANGES OF THE FLOW RATES OR BY STEP CHANGES OF THE COOLANT INLET TEMPERATURES.

371 NOWIG NOWIG IS USED TO SOLVE THE ONE-DIMENSIONAL TWO-GROUP NEUTRON DIFFUSION AND DELAYED PRECURSOR EQUATIONS USING A SHAPE-SPECIFIED POINT KINETICS APPROXIMATION. FEEDBACK DUE TO CHANGES IN THE FUEL METAL TEMPERATURE AND COOLANT DENSITY IS ACCOUNTED FOR BY USING A MODEL WHICH IS IDENTICAL WITH THAT USED IN THE WIGL2 (ACC ABSTRACT 274) PROGRAM.

389 STINT3 STINT3 SOLVES STATIC (EIGENVALUE) AND TIME-DEPENDENT SYSTEMS OF COUPLED, ONE-DIMENSIONAL, DIFFUSION TYPE EQUATIONS IN SLAB GEOMETRY AND IS PRIMARILY INTENDED FOR SOLVING SINGLE-CHANNEL, FLUX-SYNTHESIS EQUATIONS. THE CODE PROVIDES FOR CONTROL ROD MOTION AND TEMPERATURE FEEDBACK.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

400 SAS1A SAS1A IS USED FOR THE ANALYSIS OF FAST REACTOR POWER AND FLOW TRANSIENTS. THE PROGRAM CONSISTS OF FOUR DRIVER PROGRAMS EACH CALLED BY THE MAIN PROGRAM. THESE DRIVERS HANDLE THE AREAS OF (1) INPUT/OUTPUT, WITH DIAGNOSTICS, (2) STEADY-STATE INITIALIZATION, TO DEFINE THE CORE OPERATING CONDITIONS BEFORE THE INITIATION OF THE TRANSIENT, (3) THE TRANSIENT PORTION, AND (4) THE DISASSEMBLY (WEAK EXPLOSION) ANALYSIS.

405 NOAH NOAH SOLVES THE ONE-DIMENSIONAL, ONE-GROUP SPACE-TIME DIFFUSION EQUATION ACCOUNTING FOR THE EFFECTS OF FUEL, CLAD, AND COOLANT TEMPERATURES (OR BY CHANGING SUBROUTINES FUEL, COOLANT, AND SOLID MODERATOR TEMPERATURES) ON FISSION AND ABSORPTION CROSS SECTIONS, AND ON THE DIFFUSION COEFFICIENT AND THE TRANSVERSE BUCKLING. IT CAN ACCOUNT FOR THE EFFECTS OF XENON-IODINE FEEDBACK. IF DESIRED, IT WILL DETERMINE LONG-TIME XENON-FLUX BEHAVIOR ASSUMING THE TEMPERATURES TO BE IN QUASI-STATIC EQUILIBRIUM. NUMEROUS METHODS OF PERTURBATION ARE ALLOWED AND CONTROL OF THE TRANSIENT IS ALSO PROVIDED.

415 CEXE/INCEXE CEXE SOLVES THE THREE-DIMENSIONAL XYZ TIME-DEPENDENT XENON SPATIAL OSCILLATION PROBLEM USING A MODIFIED ONE ENERGY GROUP THEORY AND A NODAL REPRESENTATION.

474 QX1 QX1 SOLVES THE MULTIGROUP, ONE-DIMENSIONAL, TIME-DEPENDENT DIFFUSION EQUATIONS. PROBLEM GEOMETRY MAY BE PLANE, CYLINDRICAL, OR SPHERICAL. STEADY-STATE INITIAL CONDITIONS MAY BE ESTABLISHED EITHER FOR A SOURCE-FREE SYSTEM OR FOR A SYSTEM WITH AN EXTERNAL NEUTRON SOURCE. THE REACTOR MAY BE PERTURBED BY CHANGING MATERIAL VOLUME FRACTIONS AND/OR TEMPERATURES OR BY CHANGING THE NEUTRON SOURCE LEVEL. A FIRST-COLLISION PULSED SOURCE DISTRIBUTION MAY BE SPECIFIED. RESONANCE ABSORPTION FEEDBACK IS CALCULATED BY GROUPWISE INTERPOLATION IN A CROSS-SECTION VERSUS TEMPERATURE TABLE. A HIGHLY SIMPLIFIED FUEL TEMPERATURE MODEL IS INCLUDED.

488 NOISY1 AUTO- AND CROSS-SPECTRAL DENSITY FUNCTIONS ARE CALCULATED FOR NEUTRON FLUCTUATIONS IN NUCLEAR REACTORS. THE CALCULATIONS ARE POINT-WISE, SPACE-DEPENDENT IN CUBICAL REACTORS WHICH ARE HOMOGENEOUS AND BARE. EITHER NEUTRON FLUCTUATIONS OR THE FLUCTUATIONS SEEN BY A NEUTRON DETECTOR CAN BE SPECIFIED. FLUCTUATIONS BETWEEN EITHER TWO POINTS OR BETWEEN TWO FINITE REGIONS CAN BE CONSIDERED. THE FINITE REGIONS OR SIMULATED DETECTORS MUST EITHER FULLY OVERLAP OR NOT OVERLAP AND ARE RESTRICTED IN SHAPE TO RECTANGULAR PARALLELEPIPEDS.

F. SPACE-TIME KINETICS, COUPLED NEUTRONICS-HYDRODYNAMICS-THERMODYNAMICS AND EXCURSION SIMULATIONS 4/75

494 ADEP THE TIME-DEPENDENT FEW-GROUP NEUTRON DIFFUSION EQUATIONS ARE SOLVED IN ONE OR TWO DIMENSIONS. LUMPED PARAMETER THERMAL-HYDRAULIC EQUATIONS ARE USED TO CALCULATE FEEDBACK.

511 VENUS VENUS COMPUTES THE POWER, ENERGY RELEASE AND SPACE-TIME (R-Z GEOMETRY) HISTORY OF THE TEMPERATURE, PRESSURE, DENSITY AND MATERIAL MOTION OF AN LMFBR DURING A DISASSEMBLY EXCURSION. REACTIVITY FEEDBACK DUE TO DOPPLER BROADENING AND MOTION OF THE REACTOR MATERIAL IS TAKEN INTO ACCOUNT.

550 REXCO-H (RELEASE 1) REXCO-H CALCULATES THE TWO-DIMENSIONAL HYDRODYNAMIC RESPONSE OF PRIMARY REACTOR CONTAINMENT TO A HIGH-ENERGY EXCURSION.

615 REXCO-H (RELEASE 2) REXCO-H CALCULATES THE TWO-DIMENSIONAL HYDRODYNAMIC RESPONSE OF PRIMARY REACTOR CONTAINMENT TO A HIGH-ENERGY EXCURSION.

47 CLOUD THE CLOUD PROGRAM CALCULATES THE EXTERNAL GAMMA-RAY DOSE RATE AND TOTAL INTEGRATED DOSE RESULTING FROM THE CONTINUOUS RELEASE OF RADIOACTIVE MATERIALS TO THE ATMOSPHERE.

172 AISITE2/R153 AISITE2 IS LARGELY BASED ON METHODS PROPOSED BY THE AEC IN TID-14844 BUT DIFFERS IN CERTAIN OF THE ASSUMPTIONS AND MODELS. THE CODE AUTOMATICALLY VARIES ANY ONE OF 46 PARAMETERS SUCH AS REACTOR POWER, BUILDING LEAK RATE, IODINE CLEAN-UP RATE, AND HALOGEN FILTER EFFICIENCY, COMPUTING THE EXCLUSION AREA, AND LOW POPULATION BOUNDARY ZONES AS FUNCTIONS OF THAT PARAMETER. THE EDIT INCLUDES DOSE VS. DISTANCE DATA, FRACTIONAL CONTRIBUTION BY ISOTOPE GROUP TO THE INHALATION DOSE, AND CRITICAL DISTANCES PROVIDING BOTH PRINTED AND GRAPHICAL DATA. THREE MODELS ARE AVAILABLE FOR FISSION PRODUCT RELEASE WITH UP TO 4 LEVELS OF CONTAINMENT.

196 CURIE/DOSE/THUNDERHEAD CURIE CALCULATES THE FISSION PRODUCT INVENTORY PRODUCED IN A REACTOR DURING CONSTANT POWER OPERATION AND RELEASES DIFFERENT PERCENTAGES OF THE NOBLE GASES, HALOGENS, AND PARTICULATES TO THE ATMOSPHERE AT REACTOR SHUTDOWN. DOSE CALCULATES THE TOTAL DOSE TO 13 INTERNAL BODY ORGANS RESULTING FROM INHALATION OF THE PASSING RADIOACTIVE CLOUD. THUNDERHEAD CALCULATES THE EXTERNAL CLOUD GAMMA EXPOSURE DOSE FROM THE RELEASED FISSION PRODUCTS.

200 SATURATED BLOWDOWN2 CALCULATION OF LOCAL PRESSURES, MASS FLOW RATES, FLUID QUALITIES, SPECIFIC VOLUMES, TEMPERATURES AND LOCAL HEAT TRANSFER COEFFICIENTS AT WETTED WALLS, DURING BLOWDOWN OF THE REACTOR PRIMARY COOLANT LOOP.

228 PRECON THE PURPOSE OF THE PROGRAM IS TO DETERMINE, FOR A GAS-COOLED REACTOR, THE CONTAINMENT PRESSURE AS A FUNCTION OF TIME, AFTER RUPTURES HAVE BEEN ASSUMED TO OCCUR IN THE PRIMARY SYSTEM OR IN CONJUNCTION WITH STEAM GENERATOR RUPTURES.

229 ELBOW DEFLECTIONS, RESTRAINT FORCES AND STRESSES ARE DETERMINED IN A FUEL ELEMENT SUBJECTED TO ASYMMETRIC POWER GENERATION, CIRCUMFERENTIALLY NON-UNIFORM COOLANT TEMPERATURE DISTRIBUTION, AND ASYMMETRIC FAST NEUTRON FLUX DAMAGE.

261 GADOSE/DOSET THE GADOSE PROGRAM CALCULATES RADIOACTIVITY AND DOSES RESULTING FROM INSTANTANEOUS ACCIDENTAL RELEASE OF ACTIVITY WHILE THE COMPANION PROGRAM DOSET INCLUDES THE EFFECTS OF A TIME-DEPENDENT ACCIDENTAL FISSION PRODUCT RELEASE FOR THE HTGR TYPE OF PLANT. GIVEN AN INITIAL FISSION PRODUCT INVENTORY RELEASED INTO A REACTOR VESSEL OR CONTAINMENT VOLUME, THE QUANTITY OF EACH ISOTOPE IS CALCULATED AT A NUMBER OF TIMES AT A NUMBER OF LOCATIONS (IN THE CONTAINMENT, CONTAINMENT RECIRCULATING CLEANUP FILTERS, LEAK COLLECTOR, PLANT EXHAUST FILTERS AND IN THE ATMOSPHERE AT A NUMBER OF DISTANCES FROM THE PLANT). EACH DECAY CHAIN IS CALCULATED SEPARATELY CONSIDERING BUILDUP AND DECAY OF EACH ISOTOPE. RADIOLOGICAL DOSES ARE CALCULATED FOR ANY THREE BODY ORGANS AND THE WHOLE BODY BASED ON METEOROLOGICAL AND PHYSIOLOGICAL INPUT PARAMETERS. FALLOUT AND RAINOUT ARE INCLUDED.

265 RSAC RSAC GENERATES A FISSION PRODUCT INVENTORY FROM A GIVEN SET OF REACTOR OPERATING CONDITIONS AND THEN COMPUTES THE EXTERNAL GAMMA DOSE, THE DEPOSITION GAMMA DOSE, AND/OR THE INHALATION-INGESTION DOSE TO CRITICAL BODY ORGANS AS A RESULT OF EXPOSURE TO THESE FISSION PRODUCTS. PROGRAM OUTPUT INCLUDES REACTOR OPERATING HISTORY, FISSION PRODUCT INVENTORY, DOSAGES, AND INGESTION PARAMETERS.

268 TRANS-FUGUE1 TRANS-FUGUE1 IS A TRANSIENT SINGLE CHANNEL, TWO-PHASE FLOW, AND HEAT TRANSFER CODE FOR ANALYSIS OF POSTULATED REACTOR INCIDENTS INVOLVING BOILING. THE CODE IS BASED ON A HOMOGENEOUS HYDRODYNAMIC MODEL WHICH ASSUMES EQUAL PHASE TEMPERATURES AND VELOCITIES. IT ASSUMES VAPOR GENERATION TO BE HEAT TRANSFER LIMITED ONLY, AND CALCULATES AXIAL DISTRIBUTION OF VELOCITY, VOID FRACTION, PRESSURE, COOLANT TEMPERATURE, AND FUEL TEMPERATURE. TRANSIENTS SIMULATING POWER EXCURSIONS, LOSS OF FLOW, LOSS OF PRESSURE AND CHANNEL PLUGGING CAN BE STUDIED.

278 WHAM WHAM IS USED TO CALCULATE PRESSURE, VELOCITY, AND FORCE TRANSIENTS IN THE LIQUID-FILLED PIPING NETWORKS. IT CAN BE APPLIED TO MULTI-LOOP, COMPLEX PIPING NETWORKS CONSISTING OF ANY NUMBER OF DEAD ENDS, ELBOWS, ORIFICES, MULTIPLE BRANCH TEES, CHANGES OF FLOW PASSAGE CROSS SECTIONS, CHECK VALVES, PUMPS, PRESSURIZERS OR TANKS, AND EXIT VALVES. HYDRAULIC LOSSES ARE CONSIDERED. TRANSIENTS CAN BE INITIATED EITHER, BY CLOSURE OR BY OPENING OF ONE OR MORE EXIT VALVES (OR BY THE SYSTEM RUPTURE AT ONE OR MORE PLACES), OR BY A PRESCRIBED CHANGE IN THE TANK (OR PRESSURIZER) PRESSURE, OR BY THE PUMP POWER FAILURE. WHAM IS AN EXTENSION OF THE PROGRAM WATER-HAMMER.

284 MU555(ACT1) THIS PROGRAM WILL PREDICT THE PRESSURE TRANSIENT IN THE CONTAINMENT VESSEL AS A FUNCTION OF TIME AS A RESULT OF A MAJOR RUPTURE IN THE PRIMARY SYSTEM OF A PRESSURIZED WATER REACTOR. MEANS ARE AVAILABLE FOR INTRODUCING WATER AND HEAT INTO THE CONTAINMENT VESSEL. THERE ARE ALSO PROVISIONS FOR SPECIFYING VARIOUS TYPES OF HEAT SINKS FOR ENERGY ABSORPTION. THE TEMPERATURE DISTRIBUTION IN THESE HEAT SINKS IS CALCULATED AS A FUNCTION OF TIME. DISCHARGE RATES OF THE CONTAINMENT MAY ALSO BE DETERMINED AS A FUNCTION OF BOTH TIME AND THE INTERNAL PRESSURE.

295 FLASH3 FLASH3 DETERMINES THE TRANSIENT RESPONSE OF A WATER-COOLED REACTOR TO A LOSS-OF-COOLANT ACCIDENT OR SEVERE VARIABLE PRESSURE OPERATION.

297 CONTEMPT THE CONTEMPT COMPUTER PROGRAM PREDICTS THE PRESSURE-TEMPERATURE RESPONSE OF A DRY WELL CONTAINMENT BUILDING TO A LOSS-OF-COOLANT ACCIDENT. THE CONTAINMENT VOLUME IS SEPARATED INTO A LIQUID REGION AND A VAPOR REGION. EACH REGION IS ASSUMED TO HAVE A UNIFORM TEMPERATURE BUT THE TEMPERATURE OF THE TWO REGIONS MAY BE DIFFERENT. THE CONTAINMENT BUILDING IS REPRESENTED AS CONSISTING OF SEVERAL HEAT CONDUCTING STRUCTURES WHOSE THERMAL BEHAVIOR CAN BE DESCRIBED BY THE ONE-DIMENSIONAL MULTIREGION HEAT CONDUCTION EQUATION. WATER AND ENERGY RATES FROM DISCHARGE OF COOLANT, THE BOILING OF RESIDUAL WATER BY REACTOR DECAY HEAT, THE SUPERHEATING OF STEAM PASSING THROUGH THE CORE, AND METAL-WATER REACTIONS ARE ASSUMED AVAILABLE FROM PREVIOUS CALCULATIONS AND ARE INPUT DATA TO CONTEMPT. PROGRAM OUTPUT INCLUDES CONTAINMENT VOLUME PRESSURE AND TEMPERATURES, TEMPERATURE THROUGH BUILDING STRUCTURES, AND THE AMOUNT OF WATER, VAPOR, AND ENERGY IN THE CONTAINMENT VOLUMES. THE PROGRAM ALSO CALCULATES BUILDING LEAKAGE AND THE EFFECTS OF ENGINEERED SAFEGUARD DEVICES SUCH AS WATER SPRAY AND FAN COOLER SYSTEMS.

328 NURLOC-1.0 NURLOC-1.0 PERFORMS CORE/PRESSURE VESSEL THERMAL ANALYSIS FOR A NUCLEAR REACTOR LOSS-OF-COOLANT ACCIDENT.

330 ECCSA4 ECCSA4 PREDICTS THE THERMAL AND HYDRAULIC BEHAVIOR OF A SINGLE FUEL ROD AND ITS ASSOCIATED CORE FLOW CHANNEL DURING A LOSS-OF-COOLANT ACCIDENT AND SUBSEQUENT EMERGENCY CORE COOLING INJECTION.

366 CHEMLOC2 CHEMLOC2 IS USED TO COMPUTE THE EXTENT OF CORE HEATING AND METAL-STEAM REACTION FOLLOWING A HYPOTHETICAL LOSS-OF-COOLANT ACCIDENT, INCLUDING EMERGENCY CORE-COOLING FAILURE, IN A WATER-COOLED REACTOR. THE PROGRAM INCLUDES THE EFFECTS OF HEAT PRODUCTION BY DECAY HEATING IN THE FUEL AS WELL AS BY STEAM-METAL CHEMICAL REACTION, HEAT TRANSFER FROM THE CORE TO THE BOTTOM AND TOP GRID-SUPPORT PLATES AND TO THE WALL SURROUNDING THE CORE, AND METHODS OF CALCULATING THE EFFECTS OF CORE MOVEMENT AND MATERIAL TRANSFER ON REACHING SLUMPING TEMPERATURE.

369 RELAP4/MOD003 RELAP4 HAS BEEN DEVELOPED TO DESCRIBE THE BEHAVIOR OF WATER-COOLED NUCLEAR REACTORS SUBJECTED TO POSTULATED TRANSIENTS SUCH AS THOSE RESULTING FROM LOSS OF COOLANT, PUMP FAILURE, OR POWER EXCURSIONS. THE PROGRAM CALCULATES FLUID CONDITIONS SUCH AS FLOW, PRESSURE, MASS INVENTORY, AND QUALITY: THERMAL CONDITIONS SUCH AS SURFACE TEMPERATURES, TEMPERATURE PROFILES, AND ENERGY DISTRIBUTIONS; AND HEAT FLUXES IN POWER GENERATING AND DISSIPATING ELEMENTS. THE PROGRAM ALSO CALCULATES REACTOR POWER, DECAY HEAT, AND REACTIVITY. IN ADDITION TO DESCRIBING TRANSIENTS IN BOILING-WATER AND PRESSURIZED-WATER REACTORS, THE PROGRAM IS SUFFICIENTLY VERSATILE TO DESCRIBE TRANSIENTS IN EXPERIMENTAL THERMAL-HYDRAULIC SYSTEMS. THIS VERSION OF RELAP4 DOES NOT PROVIDE ALL OF THE SUBROUTINES REQUIRED FOR COMPLIANCE WITH THE AEC'S FINAL RULING ON THE ACCEPTANCE CRITERIA FOR ECC SYSTEMS.

433 CONTEMPT-LT/022 THE CONTEMPT-LT PROGRAM PREDICTS THE PRESSURE-TEMPERATURE RESPONSE OF A DRY WELL OR A DRY WELL WITH VENTS AND PRESSURE SUPPRESSION SYSTEM TO A LOSS-OF-COOLANT ACCIDENT. AN ADDITIONAL DUAL CONTAINMENT COMPARTMENT MAY ALSO BE MODELED IF DESIRED. THE DRY WELL IS SEPARATED INTO A LIQUID REGION AND A VAPOR REGION. EACH REGION IS ASSUMED TO HAVE A UNIFORM TEMPERATURE BUT THE TEMPERATURES OF THE TWO REGIONS MAY BE DIFFERENT. THE CONTAINMENT BUILDING IS REPRESENTED AS CONSISTING OF SEVERAL HEAT CONDUCTING STRUCTURES WHOSE THERMAL BEHAVIOR CAN BE DESCRIBED BY THE ONE-DIMENSIONAL MULTI-REGION HEAT CONDUCTION EQUATIONS. WATER AND ENERGY RATES FROM DISCHARGE OF COOLANT, BOILING OF RESIDUAL WATER BY REACTOR DECAY HEAT, SUPERHEATING OF STEAM PASSING THROUGH THE CORE, AND METAL-WATER REACTIONS ARE ASSUMED AVAILABLE FROM PREVIOUS CALCULATIONS AND ARE INPUT DATA TO THE PROGRAM. PROGRAM OUTPUT INCLUDES CONTAINMENT VOLUME PRESSURE AND TEMPERATURE, TEMPERATURES THROUGH THE BUILDING STRUCTURES, AND THE AMOUNT OF WATER, VAPOR, AND ENERGY IN THE CONTAINMENT VOLUMES. THE PRESSURE SUPPRESSION CALCULATIONS INCLUDE VENT CLEARING AND FLOW OF A TWO-COMPONENT TWO-PHASE WATER-AIR MIXTURE THROUGH THE VENTS, AND A MASS-ENERGY BALANCE IN THE WET WELL. THERE ARE PROVISIONS FOR NORMAL BUILDING LEAKAGE, LEAKAGE FROM PENETRATIONS, A FAN COOLER SYSTEM, AND DRY AND WET WELL SPRAY SYSTEMS.

435 BURST1 BURST1 PROVIDES FOR THE STUDY OF PRESSURIZED LIQUID IN A CYLINDRICAL SYSTEM IMMEDIATELY AFTER A RUPTURE OCCURS AT ONE OR BOTH ENDS OF THE SYSTEM. PRESSURE, MASS VELOCITY, AND ENTHALPY ARE CALCULATED AT EQUALLY-SPACED MESH POINTS ALONG THE LENGTH OF THE SYSTEM. THIS IS A ONE-DIMENSIONAL REPRESENTATION, ASSUMING UNIFORM CONDITIONS THROUGHOUT ANY GIVEN CROSS-SECTIONAL AREA. FORCES ON DESIGNATED SECTIONS OF THE SYSTEM CAN ALSO BE COMPUTED, WITH PROVISION FOR DIRECTIONAL CHANGES.

443 HAA3 HAA3 EVALUATES AN APPROXIMATION TO THE GENERAL INTEGRO-DIFFERENTIAL EQUATION WHICH DESCRIBES AEROSOL BEHAVIOR. THE PHYSICAL MODEL INCLUDES PARTICLE GENERATION, BROWNIAN AND GRAVITATIONAL AGGLOMERATION, SETTLING, PLATING, AND LEAKAGE FOR SPHERICAL PARTICLES. THE APPROXIMATION IS THE REQUIREMENT THAT THE SIZE DISTRIBUTION FUNCTION BE LOG-NORMAL. THE TIME-DEPENDENT PHYSICAL QUANTITIES COMPUTED ARE (1) PLATED, SETTLED, SUSPENDED, AND LEAKED VOLUME FRACTIONS, (2) GEOMETRIC MEAN DEVIATION, NUMBER CONCENTRATION, AND GEOMETRIC MEAN RADIUS FOR THE LOG-NORMAL DISTRIBUTION OF THE SUSPENDED MATERIAL, (3) THE 50 PERCENT RADIUS (BY MASS) FOR THE SUSPENDED MATERIAL, (4) THE NUMBER AND VOLUME DISTRIBUTIONS (FUNCTIONS OF RADIUS) FOR THE SETTLED, PLATED, AND LEAKED MATERIAL, (5) THE EFFECTIVE RADII FOR THE SUSPENDED, SETTLED, AND PLATED MATERIAL.

448 FLASH4 FLASH4 IS USED TO DETERMINE THE TRANSIENT RESPONSE OF A WATER-COOLED REACTOR OR HYDRAULIC SYSTEM TO SEVERE VARIABLE PRESSURE OPERATION.

479 FREADM1 FREADM1 IS A FAST REACTOR MULTICHANNEL ACCIDENT ANALYSIS PROGRAM DESIGNED TO EFFICIENTLY SIMULATE A REACTOR TRANSIENT FROM INITIATION TO THE POINT OF CORE DISASSEMBLY. MODELS ARE INCLUDED FOR NUCLEAR KINETICS (POINT MODEL), CORE THERMO-HYDRAULICS, VOIDING, FUEL REDISTRIBUTION, FAILURE PROPAGATION, PROGRAMMED REACTIVITY INSERTION, AND THE DYNAMICS OF PRIMARY SYSTEM COOLANT FLOW. A BROAD RANGE OF ASSUMED ACCIDENT INITIATING AND PROPAGATING ACTIVITIES MAY BE SIMULATED USING TRIGGERING LOGIC INCLUDED IN THE CODE.

499 MIRAB/MIRAP THE CODE MIRAB IS USED FOR BWR REACTORS AND MIRAP IS FOR PWR REACTORS. THE CODES CALCULATE THE REMOVAL OF FISSION PRODUCT IODINE FROM A DRY-TYPE BWR/PWR CONTAINMENT SYSTEM ATMOSPHERE UNDER REACTOR ACCIDENT CONDITIONS. THE METHOD CONSIDERS THE SIMULTANEOUS REMOVAL BY NATURAL DEPOSITION ON SURFACES OR ABSORPTION IN WATER, BY ENGINEERED SPRAY SYSTEM OPERATION, BY ADSORPTION ON FILTERS, AND BY LEAKAGE FROM THE CONTAINMENT. IN ADDITION, THE SIMULTANEOUS BEHAVIOR OF THREE IODINE FORMS IS MODELED - SPECIFICALLY ELEMENTAL IODINE, METHYL IODINE, AND PARTICULATE IODINE. THE PROGRAMS GENERATE IODINE CONCENTRATIONS AND ACCUMULATIONS THROUGHOUT THE CONTAINMENT SYSTEM AS A FUNCTION OF TIME AFTER START OF THE ACCIDENT.

500 FRCRL2 THE CODE CALCULATES THE CUMULATIVE FRACTIONAL RELEASE OF FISSION PRODUCTS FROM NUCLEAR REACTOR FUEL UNDER POSTULATED LOSS-OF-COOLANT ACCIDENT CONDITIONS. THE MATHEMATICAL MODEL FOR RELEASE IS BASED ON SIMPLE VOLUME DIFFUSION THEORY AND THE EQUIVALENT-SPHERE APPROXIMATION OF FUEL POROSITY. BOTH THE OPERATIONAL PREACCIDENT RELEASE COMPONENT AND THE ACCIDENT CORE THERMAL TRANSIENT-INDUCED RELEASE COMPONENT ARE CALCULATED. DETAILED CORE TEMPERATURE DATA ARE NEEDED TO MAKE THE LATTER SET OF COMPUTATIONS. IN ADDITION, SPECIFIC CORE POWER DISTRIBUTION FACTORS AND FISSION PRODUCT DIFFUSION PARAMETERS MUST BE SUPPLIED.

508 MUCHA1/MUCHA2 MUCHA1 PREDICTS THE THERMAL AND HYDRAULIC BEHAVIOR OF ANY TWO REACTOR FUEL RODS AND THEIR ASSOCIATED PARALLEL FLOW CHANNELS DURING A LOSS-OF-COOLANT ACCIDENT USING AS BOUNDARY CONDITIONS PLENUM FLUID CONDITIONS DETERMINED BY MUCHA2 OR A SYSTEM-ORIENTED CODE. MUCHA2 PREDICTS THE THERMAL AND HYDRAULIC BEHAVIOR OF THE PRIMARY COOLANT WITHIN THE REACTOR PRESSURE VESSEL DURING A LOSS-OF-COOLANT ACCIDENT. THE HEATED CORE IS REPRESENTED BY TWO EQUIVALENT FUEL RODS AND THEIR ASSOCIATED PARALLEL FLOW CHANNELS. A PLENUM MODEL HAS BEEN DEVELOPED TO PREDICT THE UPPER AND LOWER PLENUM FLUID CONDITIONS THROUGHOUT THE ACCIDENT SEQUENCE FOR USE AS BOUNDARY CONDITIONS FOR THE PARALLEL CORE CHANNELS.

512 THETA1B THETA1B COMPUTES THE THERMAL RESPONSE CHARACTERISTICS OF A NUCLEAR FUEL ROD SUBJECTED TO A LOSS-OF-COOLANT ACCIDENT ENVIRONMENT.

528 PREP/KITT THE PREP/KITT COMPUTER PROGRAM PACKAGE OBTAINS SYSTEM RELIABILITY INFORMATION FROM A SYSTEM FAULT TREE. THE PREP PROGRAM FINDS THE MINIMAL CUT SETS AND/OR THE MINIMAL PATH SETS OF THE SYSTEM FAULT TREE. (A MINIMAL CUT SET IS A SMALLEST SET OF COMPONENTS SUCH THAT IF ALL THE COMPONENTS ARE SIMULTANEOUSLY FAILED THE SYSTEM IS FAILED. A MINIMAL PATH SET IS A SMALLEST SET OF COMPONENTS SUCH THAT IF ALL OF THE COMPONENTS ARE SIMULTANEOUSLY FUNCTIONING THE SYSTEM IS FUNCTIONING.) THE KITT PROGRAMS DETERMINE RELIABILITY INFORMATION FOR THE COMPONENTS OF EACH MINIMAL CUT OR PATH SET, FOR EACH MINIMAL CUT OR PATH SET, AND FOR THE SYSTEM. EXACT, TIME-DEPENDENT RELIABILITY INFORMATION IS DETERMINED FOR EACH COMPONENT AND FOR EACH MINIMAL CUT SET OR PATH SET. FOR THE SYSTEM, RELIABILITY RESULTS ARE OBTAINED BY UPPER BOUND APPROXIMATIONS OR BY A BRACKETING PROCEDURE IN WHICH VARIOUS UPPER AND LOWER BOUNDS MAY BE OBTAINED AS CLOSE TO ONE ANOTHER AS DESIRED. THE KITT PROGRAMS CAN HANDLE INDEPENDENT COMPONENTS WHICH ARE NONREPAIRABLE OR WHICH HAVE A CONSTANT REPAIR TIME. ANY ASSORTMENT OF NONREPAIRABLE COMPONENTS AND COMPONENTS HAVING CONSTANT REPAIR TIMES CAN BE CONSIDERED. ANY INHIBIT CONDITIONS HAVING CONSTANT PROBABILITIES OF OCCURRENCE CAN BE HANDLED. THE FAILURE INTENSITY OF EACH COMPONENT IS ASSUMED TO BE CONSTANT WITH RESPECT TO TIME. THE KITT2 PROGRAM CAN ALSO HANDLE COMPONENTS WHICH DURING DIFFERENT TIME INTERVALS, CALLED PHASES, MAY HAVE DIFFERENT RELIABILITY PROPERTIES.

529 ANVENT THE ANVENT PROGRAM WAS DEVELOPED TO ANALYZE THERMAL EFFECTS OF A LOSS-OF-COOLANT ACCIDENT (LOCA) IN A WESTINGHOUSE ICE CONDENSER NUCLEAR UNIT, SIMILAR TO THE DUKE POWER COMPANYS MCGUIRE UNITS. THE PROGRAM IS CAPABLE OF EVALUATING (1) STEADY-STATE RADIAL TEMPERATURE DISTRIBUTIONS CORRESPONDING TO FIXED INSIDE AND OUTSIDE TEMPERATURES, (2) RADIAL TEMPERATURE DISTRIBUTIONS IN THE STEEL CONTAINMENT SHELL AND THE CONCRETE REACTOR (SHIELD) BUILDING DURING THE POST-LOCA TRANSIENT, (3) TEMPERATURE AND PRESSURE IN THE ANNULUS BETWEEN THE CONTAINMENT SHELL AND REACTOR BUILDING DURING THE POST-LOCA TRANSIENT, AND (4) CAPABILITY OF THE ANNULUS VENTILATION FAN TO QUICKLY ATTAIN AND MAINTAIN A VACUUM IN THE ANNULUS AFTER A LOCA OCCURS.

546 EMERALD THE EMERALD PROGRAM IS DESIGNED FOR THE CALCULATION OF RADIATION RELEASES AND EXPOSURES RESULTING FROM NORMAL AND ABNORMAL OPERATION OF A LARGE PRESSURIZED WATER REACTOR. THE APPROACH USED IN EMERALD IS SIMILAR TO AN ANALOG SIMULATION OF A REAL SYSTEM. EACH COMPONENT OR VOLUME IN THE PLANT WHICH CONTAINS A RADIOACTIVE MATERIAL IS REPRESENTED BY A SUBROUTINE, WHICH KEEPS TRACK OF THE PRODUCTION, TRANSFER, DECAY AND ABSORPTION OF RADIOACTIVITY IN THAT VOLUME. DURING THE COURSE OF THE ANALYSIS OF AN ACCIDENT, ACTIVITY IS TRANSFERRED FROM SUBROUTINE TO SUBROUTINE IN THE PROGRAM AS IT WOULD BE TRANSFERRED FROM PLACE TO PLACE IN THE PLANT. FOR EXAMPLE, IN THE CALCULATION OF THE DOSES RESULTING FROM A LOSS-OF-COOLANT ACCIDENT THE PROGRAM FIRST CALCULATES THE ACTIVITY BUILT UP IN THE FUEL BEFORE THE ACCIDENT, THEN RELEASES SOME OF THIS ACTIVITY TO THE CONTAINMENT VOLUME. SOME OF THIS ACTIVITY IS THEN RELEASED TO THE ATMOSPHERE. THE RATES OF TRANSFER, LEAKAGE, PRODUCTION, CLEANUP, DECAY, AND RELEASE ARE READ IN AS INPUT TO THE PROGRAM. SUBROUTINES ARE ALSO INCLUDED WHICH CALCULATE THE ON-SITE AND OFF-SITE RADIATION EXPOSURES AT VARIOUS DISTANCES, FOR INDIVIDUAL ISOTOPES AND SUMS OF ISOTOPES. THE PROGRAM CONTAINS A LIBRARY OF PHYSICAL DATA FOR THE TWENTY-FIVE ISOTOPES OF MOST INTEREST IN LICENSING CALCULATIONS, AND OTHER ISOTOPES CAN BE ADDED OR SUBSTITUTED. BECAUSE OF THE FLEXIBLE NATURE OF THE SIMULATION APPROACH, THE EMERALD PROGRAM CAN BE USED FOR MOST CALCULATIONS INVOLVING THE PRODUCTION AND RELEASE OF RADIOACTIVE MATERIALS, INCLUDING DESIGN, OPERATIONAL AND LICENSING STUDIES.

548 CEBUG THE TRANSIENT HYDRAULIC BEHAVIOR OF THE SODIUM IN A SODIUM-HEATED STEAM GENERATOR IN WHICH A SODIUM-WATER REACTION OCCURS DUE TO A LARGE WATER LEAK IS CALCULATED FOR FLOWS IN UP TO THREE DIMENSIONS.

554 DISPER DISPER DETERMINES THE AEROSOL PARTICLE SOURCE STRENGTH OUTSIDE AN ENCLOSURE DUE TO A RELEASE OF AEROSOL PARTICLES WITHIN THE ENCLOSURE. THE RELEASE IS ASSUMED TO PRESSURIZE THE ENCLOSURE AND THE AIRBORNE PARTICLES ARE CARRIED BY THE ESCAPING GAS INTO LEAK PATHS IN THE ENCLOSURE WALLS. HERE, THEY MAY BE DEPOSITED ON THE LEAK PATH WALLS OR REMAIN ENTRAINED AND ESCAPE FROM THE ENCLOSURE.

555 PARET THIS PROGRAM IS DESIGNED FOR USE IN PREDICTING THE COURSE AND CONSEQUENCES OF NONDESTRUCTIVE REACTIVITY ACCIDENTS IN SMALL REACTOR CORES.

559 SOFIRE2 1- AND 2-CELL SOFIRE2 ONE CELL, CALCULATES THE CONSEQUENCES OF A SODIUM POOL FIRE IN A CLOSED VAULT. GAS PRESSURE IN THE VAULT IS CALCULATED FROM THE GAS DENSITY AND TEMPERATURE. SOFIRE2 TWO CELL, CALCULATES THE CONSEQUENCES OF A SODIUM POOL FIRE IN A VAULT CONNECTED TO A CONTAINMENT STRUCTURE THROUGH A RESTRICTED OPENING. COLD GAS FLOWS FROM THE CONTAINMENT TO THE VAULT DUE TO MASS DIFFERENCES WHILE HOT GAS FLOWS FROM THE VAULT TO THE CONTAINMENT TO EQUILIBRATE PRESSURES. PRESSURE IN THE CONTAINMENT IS CALCULATED FROM THE GAS DENSITY AND TEMPERATURE. IN BOTH PROGRAMS THE SODIUM BURNING RATE IS GOVERNED BY THE RATE OF OXYGEN DIFFUSION TO THE SODIUM SURFACE.

583 STEFEG STEFEG CALCULATES GASEOUS SOURCE TERMS. IT COMPUTES THE GASEOUS RELEASES THROUGH VARIOUS PATHS FROM BOILING WATER REACTORS AND/OR PRESSURIZED WATER REACTORS.

584 FPFM FPFM IS USED IN RADIOLOGICAL SAFETY ANALYSES OF LINE REACTORS (BWR'S AND PWR'S ONLY) TO CALCULATE: (1) MAXIMUM NOBLE GAS RELEASE TO THE FUEL CLADDING GAP FOR TOTAL CORE DURING STEADY-STATE OPERATION, (2) NOBLE GAS RELEASED TO THE REACTOR PRIMARY SYSTEM FOR SELECTED PIN PERFORATIONS, AND (3) INTERNAL PIN PRESSURE (OPTIONAL).

590 INTEG/INSPEC THESE PROGRAMS ANALYZE THE CHARACTERISTICS OF A GENERAL MODEL DEVELOPED TO REPRESENT THE SAFETY ASPECTS OF AN OPERATING NUCLEAR REACTOR. THESE CHARACTERISTICS ARE THE FREQUENCIES OF INCIDENTS THAT ARE DEPARTURES FROM THE EXPECTED BEHAVIOR OF THE REACTOR. EACH INCIDENT IS ASSUMED TO BE PRECEDED BY A SEQUENCE OF EVENTS STARTING AT SOME INITIATING EVENT. AT EACH MEMBER IN THIS SEQUENCE THERE MAY BE FUNCTIONS SUCH AS SAFETY CIRCUITS, AND PERSONNEL OPERATIONS THAT STOP THE SEQUENCE AT THAT MEMBER. WHEN MECHANICAL DEVICES FAIL THEY ARE ASSUMED TO REMAIN INOPERATIVE UNTIL REPAIRED. THE MODEL ACCOUNTS FOR SCHEDULED INSPECTION AND MAINTENANCE OF ALL EQUIPMENT IN THE SYSTEM.

600 EGAD EGAD CALCULATES GAMMA DOSE INTEGRALS TO A GROUND LEVEL RECEPTOR, FOR INCREMENTAL VALUES OF THE VERTICAL DISPERSION PARAMETER SIGMA-Z, AS A FUNCTION OF GAMMA ENERGY AND SPATIAL DISTRIBUTION OF THE RADIOACTIVE MATERIAL. THE DOSE INTEGRALS ARE REPRESENTATIVE OF SECTOR AVERAGES SINCE THE DISTRIBUTION OF MATERIAL IS ASSUMED TO BE GAUSSIAN IN THE VERTICAL, HOMOGENEOUS IN THE HORIZONTAL, AND BOUNDED BETWEEN GROUND LEVEL AND AN INVERSION LID. CALCULATED DOSE INTEGRALS ARE INDEPENDENT OF RADIOACTIVE DECAY, TRANSPORT VELOCITY, DOWNWIND DISTANCE, AND SECTOR WIDTH. SPACE ATTENUATION AND BUILDUP ARE TAKEN INTO ACCOUNT.

152 ARGUS (RE248) THIS PROGRAM CALCULATES TRANSIENT TEMPERATURES IN A CONCENTRIC, CYLINDRICAL CONFIGURATION. UP TO 25 CONCENTRIC REGIONS ARE ALLOWED, EACH CONTAINING EITHER A STATIONARY (SOLID OR NON-FLOWING LIQUID) OR TURBULENTLY FLOWING (LIQUID OR GAS) MATERIAL. ANY STATIONARY REGION CAN HAVE SPATIAL- AND TIME-DEPENDENT HEAT GENERATION. TEMPERATURES ARE CALCULATED AT NODE POINTS EQUALLY-SPACED WITHIN A REGION. FILM COEFFICIENTS ON FLOWING REGION BOUNDARIES ARE CALCULATED BY THE PROGRAM. TIME-DEPENDENT COOLANT VELOCITIES ARE PERMITTED. THE HEAT SOURCE IS ASSUMED TO BE ANGULAR INDEPENDENT. AXIAL HEAT CONDUCTION IS NEGLECTED, BUT AXIAL HEAT TRANSPORT DUE TO MATERIAL MOTION IS CONSIDERED IN THE FLOWING REGIONS.

155 PTH1 THIS PROGRAM CALCULATES CONTAINMENT SHELL PRESSURE-TEMPERATURE HISTORY RESULTING FROM AQUEOUS COOLANT SYSTEM BLOWDOWN.

182 AXFLU AXFLU CALCULATES HEAT TRANSFER FROM A LATTICE OF FLUID CYLINDRICAL FUEL PINS TO COOLANT IN EITHER SLUG OR FULLY-DEVELOPED LAMINAR FLOW. SOLUTION IS ANALYTIC AND CLOSED, EXCEPT FOR SATISFYING BOUNDARY CONDITIONS AT A FINITE, (BUT ARBITRARY), NUMBER OF BOUNDARY POINTS.

183 AXTHRM AXTHRM CALCULATES HEAT TRANSFER FROM A TRIANGULAR LATTICE OF CLAD SOLID CYLINDRICAL FUEL PIN TO COOLANT IN EITHER SLUG OR FULLY-DEVELOPED LAMINAR FLOW. SOLUTION IS ANALYTIC AND CLOSED, EXCEPT FOR SATISFYING BOUNDARY CONDITIONS AT A FINITE, (BUT ARBITRARY), NUMBER OF BOUNDARY POINTS.

198 HEATING2 HEATING2 IS A GENERALIZED HEAT TRANSFER CODE CAPABLE OF SOLVING TRANSIENT AND/OR STEADY-STATE COORDINATE SYSTEMS. THE SIMPLIFIED INPUT MAKES IT A VERY USEFUL CODE FOR THOSE PROBLEMS HAVING GEOMETRICAL CONFIGURATIONS WHICH CAN BE DESCRIBED BY PARALLEL AND PERPENDICULAR LINES OR PLANES, OR CONCENTRIC CIRCLES. THESE FIGURES CAN BE BROKEN UP INTO A MAXIMUM OF 100 ONE-MATERIAL REGIONS WITH POSITION AND TIME-DEPENDENT VOLUMETRIC HEAT GENERATION RATES. UP TO 40 MATERIALS WITH CONSTANT PROPERTIES CAN BE DESCRIBED, AND THE INITIAL TEMPERATURES OF THESE REGIONS ARE POSITION-DEPENDENT. THE BOUNDARIES OF THESE REGIONS CAN BE CONTACT, INSULATED, TIME-DEPENDENT TEMPERATURE CONTROLLED, OR FORCED CONVECTION WITH A TIME-DEPENDENT SINK TEMPERATURE. ALSO A RADIATION BOUNDARY WITH A TIME-DEPENDENT SINK TEMPERATURE IS INCLUDED.

205 BLOOST5 BLOOST5 COMBINES A REACTOR KINETICS CODE WITH A TWO-DIMENSIONAL HEAT TRANSFER CODE, AND IS APPLICABLE TO PROBLEMS FOR WHICH THE SPACE-INDEPENDENT FORM OF THE REACTOR KINETICS EQUATION IS APPLICABLE.

242 RATH MESHER/RATH WANTON THESE CODES SOLVE THE TWO- AND THREE-DIMENSIONAL HEAT CONDUCTION PROBLEM IN GENERAL GEOMETRIES. TIME, TEMPERATURE, AND POSITION-DEPENDENT PHYSICAL PROPERTIES CAN BE USED.

246 FLOW-MODEL A MULTI-CHANNEL, TWO-DIMENSIONAL, TWO-PHASE FLOW MODEL, DESIGNED TO COMPUTE THE AXIAL AND RADIAL COOLANT DENSITY AND QUALITY PROFILES, THE AXIAL PRESSURE PROFILE AND THE WEIGHT FLOW DISTRIBUTION FOR AN OPEN MATRIX FLOW, BOILING WATER REACTOR.

256 MANTA MANTA IS A PROGRAM WHICH PROVIDES A THERMAL-HYDRALLIC NODAL ANALYSIS IN THE STEADY STATE. IT WAS DESIGNED TO ANALYZE FUEL ELEMENT CONFIGURATION IN THE SUPERHEAT DEVELOPMENT PROGRAM. MANTA ANALYZES MIXING BETWEEN COOLANT CHANNELS, ALLOWS FOR TEMPERATURE VARIANT CONDUCTIVITY IN ADMITTANCE CALCULATIONS, AND MULTIPLE STACKED SEGMENTS THROUGH THE FUEL REGION FOR A 7 ELEMENT CLUSTER ANALYSIS OVER A LENGTH OF UP TO 8 FEET. MANTA IS DESIGNED FOR SINGLE-PASS STEAM FLOW. THE FLOW DIRECTION IN THE COOLANT CHANNELS MAY BE EITHER UP OR DOWN, THEREBY PERMITTING THE ANALYSIS OF TWO-PASS AS WELL AS SINGLE-PASS FUEL ELEMENTS. MANTA ACCOUNTS FOR THE HEAT TRANSFER AND PRESSURE DROP THAT MAY OCCUR BETWEEN COOLANT CHANNELS DUE TO MIXING AS WELL AS TO THE CONVENTIONAL HEAT TRANSFER AND PRESSURE DROP RELATIONSHIPS DUE TO FRICTION, DISCONTINUITIES, ACCELERATION, CONVECTION, CONDUCTION, AND RADIATION. MANTA ALLOWS FOR THE CALCULATION AT EACH NODE OF THE MATERIAL PROPERTIES VISCOSITY, SPECIFIC HEAT, CONDUCTIVITY, AND SPECIFIC VOLUME TO CORRESPOND TO THE ACTUAL NODE TEMPERATURE BEING SOLVED FOR. THE CDC6600 VERSION USES SODIUM FOR THE WORKING FLUID RATHER THAN STEAM.

267 WATER WATER IS A SUBROUTINE USED TO EXTRACT THERMODYNAMIC AND TRANSPORT PROPERTIES OF LIQUID, VAPOR, AND SUPERCRITICAL WATER BY TABULAR INTERPOLATION OVER THE RANGE OF STATES - 14.5 TO 14,500 PSIA AND 32 TO 1472 DEGREES F. THESE PROPERTIES ARE SPECIFIC VOLUME, SPECIFIC ENTHALPY, DYNAMIC VISCOSITY, AND THERMAL CONDUCTIVITY, TABULATED FOR PRESSURE AND TEMPERATURE CONDITIONS.

272 FIGRC FIGRC CALCULATES THE ONE-DIMENSIONAL STEADY-STATE TEMPERATURE DISTRIBUTION AND TOTAL FUEL SWELLING FOR METAL-CLAD, AXISYMMETRIC, BULK-OXIDE CYLINDRICAL FUEL ELEMENTS. THE FUEL PELLET MAY BE SOLID, ANNULAR, OR CONTAIN TWO RADIAL ZONES. OXIDE FUEL THERMAL CONDUCTIVITY IS A FUNCTION OF TEMPERATURE, DEPLETION, AND POROSITY. FUEL SWELLING IS A FUNCTION OF TEMPERATURE, DEPLETION, INTERNAL HYDROSTATIC PRESSURE, AND FISSIONING RATE. FUEL-CLAD GAP CONDUCTANCE IS A FUNCTION OF GAS COMPOSITION, TEMPERATURE, AND GAP THICKNESS AT OPERATING CONDITIONS. EITHER THE CLAD SURFACE FLUX OR THE TEMPERATURE AT THE INSIDE RADIUS OF THE FUEL MAY BE SPECIFIED AS A BOUNDARY CONDITION FOR THE HEAT CONDUCTION EQUATION. THERMAL EXPANSION OF THE FUEL AND CLADDING IS ACCOUNTED FOR. TRANSIENT TEMPERATURE CALCULATIONS CAN THEN BE PERFORMED STARTING FROM THE STEADY-STATE SOLUTION WITH USER-SPECIFIED HEAT GENERATION AND WATER TEMPERATURE TABLES.

286 HCT2 HCT2 IS A DIGITAL COMPUTER PROGRAM TO SOLVE TWO-DIMENSIONAL PLANE AND AXIALLY SYMMETRIC STEADY-STATE AND TRANSIENT HEAT CONDUCTION PROBLEMS WITH DIAGONAL BOUNDARIES AND INTERFACES. MESH SPACING (AT MOST 5000 POINTS) IS COMPLETELY VARIABLE. AS MANY AS 99 REGIONS ARE PERMITTED IN ORDER TO DESCRIBE SPATIAL VARIATIONS IN MATERIAL PROPERTIES, HEAT GENERATION RATES, AND BOUNDARY CONDITIONS. THE HEAT GENERATION RATE AND BOUNDARY CONDITIONS MAY VARY WITH TIME.

294 MOBSS/HOH BY MAKING CALLS ON A SUBROUTINE CALLED HOH, MOBSS EDITS THERMODYNAMIC AND TRANSPORT PROPERTIES OF WATER OVER THE RANGE 14.5 TO 2538 PSIA AND UP TO 608 DEGREES FAHRENHEIT BELOW SATURATION AND 932 DEGREES FAHRENHEIT ABOVE SATURATION.

299 LION4 LION4 IS A COMPUTER PROGRAM FOR CALCULATING ONE-, TWO-, OR THREE-DIMENSIONAL TRANSIENT AND STEADY-STATE TEMPERATURE DISTRIBUTIONS IN REACTOR AND REACTOR PLANT COMPONENTS. IT IS USED PRIMARILY FOR THERMAL-STRUCTURAL ANALYSES. IT UTILIZES FINITE DIFFERENCE TECHNIQUES WITH FIRST-ORDER FORWARD DIFFERENCE INTEGRATION AND IS CAPABLE OF HANDLING A WIDE VARIETY OF BOUNDING CONDITIONS.

HEAT TRANSFER SITUATIONS ACCOMMODATED INCLUDE FORCED AND FREE CONVECTION IN BOTH REDUCED AND FULLY-AUTOMATED TEMPERATURE DEPENDENT FORMS, COOLANT FLOW EFFECTS, A LIMITED THERMAL RADIATION CAPABILITY, A STATIONARY OR STAGNANT FLUID GAP, A DUAL DEPENDENCY (TEMPERATURE DIFFERENCE AND TEMPERATURE LEVEL) HEAT TRANSFER, AN ALTERNATIVE HEAT TRANSFER MODE COMPARISON AND SELECTION FACILITY COMBINED WITH HEAT FLUX DIRECTION SENSOR, AND ANY FORM OF TIME-DEPENDENT BOUNDARY TEMPERATURES. THE PROGRAM, WHICH HANDLES TIME AND SPACE DEPENDENT INTERNAL HEAT GENERATION, CAN ALSO PROVIDE TEMPERATURE DEPENDENT MATERIAL PROPERTIES WITH LIMITED NON-ISOTROPIC PROPERTIES. USER-ORIENTED CAPABILITIES AVAILABLE INCLUDE TEMPERATURE MEANS WITH VARIOUS WEIGHTINGS AND A COMPLETE HEAT FLOW RATE SURVEILLANCE SYSTEM.

331 M0219(FLOT1) FLOT1 WILL PREDICT THE STEADY-STATE FLOW AND THE FLOW TRANSIENT DUE TO THE SUBSEQUENT LOSS OF POWER TO ALL PUMPS AND TERMINATE THE TRANSIENT AT A SPECIFIED TIME OR IT WILL PREDICT THE FLOW TRANSIENT IN WHICH ONLY SOME OF THE PUMPS ARE LOST. THIS LATTER TRANSIENT MAY BE TERMINATED BY A MAXIMUM TRANSIENT TIME OR BY CHECK VALVE CLOSURES IN ALL LOOPS IN WHICH PUMPING POWER IS LOST. IN THE LATTER EVENT, THE PROGRAM WILL PREDICT THE SUBSEQUENT STEADY-STATE FLOW DISTRIBUTION.

346 THTF THTF (TRANSIENT HEAT TRANSFER VERSION F) PROVIDES A SOLUTION CAPABILITY FOR LARGE COMPLEX, THREE-DIMENSIONAL TRANSIENT AND STEADY-STATE HEAT TRANSFER PROBLEMS WHICH CAN INCLUDE CONDUCTION, CONVECTION, AND RADIATION WITH THE OPTION TO COMPUTE FLUID FLOW RATES ON A ONE-DIMENSIONAL BASIS.

348 TOPS THE TOPS PROGRAM IS A DIGITAL SIMULATION OF PRESSURIZER DYNAMICS BASED ON A PICOROLS APPLICATION OF THE FIRST LAW OF THERMODYNAMICS AND PHENOMOLOGICAL HEAT AND MASS TRANSFER LAWS WITH EMPIRICALLY DETERMINED COEFFICIENTS. THE PROGRAM IS USEFUL IN STUDYING THE THERMODYNAMIC PATHS OF PRESSURIZER TRANSIENTS AND IS CONVENIENT TO USE AS A DESIGN TOOL.

349 TCODEE THE TCODEE PROGRAM CALCULATES TEMPERATURES AT THE CENTER POINTS OF A TWO-DIMENSIONAL ARRAY IN X-Y, R-Z, OR R-THETA GEOMETRY. THE MESH IN THIS ARRAY MAY BE VARIABLY-SPACED. AVERAGED MATERIAL CONSTANTS ARE USED WHICH MAY BE SPATIAL AND TEMPERATURE DEPENDENT. PROVISION IS MADE IN THE PROGRAM FOR MATERIAL PHASE CHANGES. CHANNELS FOR FORCED FLOW COOLANT MAY BE INCLUDED AT EXTERIOR BOUNDARIES. IN ADDITION TO THE TEMPERATURE ARRAY, PROGRAM OUTPUT INCLUDES SURFACE TEMPERATURES AND HEAT FLUXES.

382 RAPP RAPP COMPUTES THE RELATIONSHIP AMONG MASS FLOW, PRESSURE, AND PIPING RESISTANCE (K-FACTOR) FOR HIGH VELOCITY FLOW OF A TWO-PHASE MIXTURE OF STEAM AND WATER. THE SOURCE FLUID MAY BE SUBCOOLED OR SATURATED WATER, SATURATED STEAM, OR A MIXTURE OF STEAM AND WATER. THE DOWNSTREAM PRESSURE MUST BE BELOW THE SATURATION PRESSURE OF THE SOURCE FLUID. SPECIFIC APPLICATIONS INCLUDE PRESSURIZER SURGE LINE PRESSURE DROP AND PRESSURE DISTRIBUTION DOWNSTREAM OF A RELIEF VALVE.

395 FLAC THE FLOW ANALYSIS CODE FLAC CALCULATES THE STEADY-STATE FLOW AND PRESSURE DISTRIBUTION IN AN ARBITRARY NETWORK. THE PROGRAM INCLUDES THE POSSIBILITY OF HEAT ADDITION AND MASS ADDITION IN ANY PORTION OF THE NETWORK.

396 WASP WASP USES A UNIQUE METHOD TO QUICKLY CALCULATE VARIOUS WATER AND STEAM PHYSICAL PROPERTIES OVER AN EXTREMELY WIDE RANGE.

408 TAC2D TAC2D IS DESIGNED TO TREAT TRANSIENT, TWO-DIMENSIONAL HEAT TRANSFER PROBLEMS. STEADY-STATE PROBLEMS ARE TREATED BY CONSIDERING THE PROBLEM TO BE A TRANSIENT, STARTING WITH AN ASSUMED TEMPERATURE DISTRIBUTION AND RUNNING UNTIL EQUILIBRIUM CONDITIONS ARE ESTABLISHED. GEOMETRICALLY, RECTANGULAR (X-Y), CYLINDRICAL (R,Z), OR CIRCULAR (R,THETA) COORDINATES MAY BE USED.

414 TAC3D TAC3D IS DESIGNED TO TREAT TRANSIENT, THREE-DIMENSIONAL HEAT TRANSFER PROBLEMS. STEADY-STATE PROBLEMS ARE TREATED BY CONSIDERING THE PROBLEM TO BE A TRANSIENT, STARTING WITH AN ASSUMED TEMPERATURE DISTRIBUTION AND RUNNING UNTIL EQUILIBRIUM CONDITIONS ARE ESTABLISHED. GEOMETRICALLY, THE PROBLEM MAY BE DEFINED BY EITHER RECTANGULAR (X,Y,Z) OR CYLINDRICAL (R,Z,THETA) COORDINATES.

424 GLUB1 GLUB1 SOLVES THE WATERLOGGING TRANSIENT CAUSED BY THE EXISTENCE OF A FUEL ELEMENT CLADDING DEFECT DURING AN INCREASE IN POWER. THE POWER IS EITHER - CASE 1, PUT IN AS AN ARBITRARY FUNCTION OF TIME, OR CASE 2, ASSUMED TO BE A SERIES OF LINEAR RAMPS TO A NEW STEADY-STATE WITH STEEPER AND STEEPER SLOPES. ALL THE GEOMETRY AND METAL PROPERTIES ARE INPUT QUANTITIES. WATER PROPERTIES ARE OBTAINED FROM INTERNAL TABLES. CLAD AND FUEL THERMAL, STRESS, AND STRAIN COMPUTATIONS ARE PERFORMED. THE OUTPUT CONSISTS OF INTERNAL PRESSURE AND DEFECT FLOW. FOR CASE 1, THE CLAD STRESS VERSUS TIME IS OUTPUT, AND FOR CASE 2, THE NEW STEADY-STATE POWER WHICH JUST CAUSES CLAD FAILURE IS OUTPUT.

432 COBRA3C COBRA3C CALCULATES THE STEADY-STATE AND TRANSIENT FLOW, ENTHALPY AND PRESSURE DROP IN THE SUBCHANNELS OF ROD BUNDLE NUCLEAR FUEL ELEMENTS DURING BOTH BOILING AND NONBOILING CONDITIONS. THE PROGRAM USES A MATHEMATICAL MODEL THAT INCLUDES THE EFFECTS OF TURBULENT AND DIVERSION CROSSFLOW MIXING BETWEEN THE SUBCHANNELS. A THERMAL MODEL OPTION IS INCLUDED TO CALCULATE RADIAL FUEL TEMPERATURE DISTRIBUTION AS A FUNCTION OF USER-SPECIFIED POWER GENERATION AND HEAT TRANSFER CORRELATIONS. CRITICAL HEAT FLUX CALCULATIONS CAN ALSO BE PERFORMED BY USER OPTION. FORCED CROSSFLOW MIXING DUE TO DIVERTER VANES OR WIRE WRAPS CAN BE CONSIDERED.

440 DYNAM DYNAM PERFORMS A DYNAMIC ANALYSIS OF ONCE-THROUGH BOILING FLOW OSCILLATIONS WITH STEAM SUPERHEAT. THE MODEL DESCRIBING THE SUPERHEAT REGIME (SINGLE-PHASE, VARIABLE DENSITY FLUID) FOR SUBCRITICAL PRESSURE OPERATION IS ALSO APPLICABLE TO THE STUDY OF ONCE-THROUGH OPERATION USING SUPERCRITICAL PRESSURE WATER.

458 VELVET2 VELVET2 SOLVES THE COUPLED HEAT TRANSFER EQUATIONS IN THE FUEL, GAP, CLADDING, AND COOLANT FOR A TRIANGULAR-SPACED, CLOSE-PACKED FUEL ROD BUNDLE WITH LIQUID METAL COOLANT. THE MODEL INCLUDES TEMPERATURE-DEPENDENT MATERIAL PROPERTIES, TURBULENT VELOCITY DISTRIBUTION IN THE COOLANT, AND CONTRIBUTIONS TO COOLANT HEAT TRANSFER BY TURBULENT MIXING.

473 CHIC-KIN CHIC-KIN TREATS FAST AND INTERMEDIATE REACTIVITY TRANSIENTS IN A WATER-COOLED HETEROGENEOUS NUCLEAR REACTOR. THE PROGRAM CALCULATES THE POWER, TEMPERATURES, AND INTERNAL PRESSURE SURGES WHEN CONTROL ROD MOTION, INLET TEMPERATURE, INLET FLOW, AND SYSTEM PRESSURE ARE KNOWN FUNCTIONS OF TIME. THE REACTOR MODEL CONSIDERED IS A SINGLE PASS WATER-COOLED CORE REPRESENTED BY A SINGLE FUEL ELEMENT-COOLANT PASSAGE SYSTEM WITH REACTIVITY FEEDBACK TO THE KINETICS EQUATIONS.

483 REPP THE REPP COMPUTER CODE PROVIDES A METHOD FOR (1) EVALUATING FUEL TEMPERATURES AND CRITICAL HEAT FLUX MARGINS FOR A FIXED REACTOR CORE AND FUEL DESIGN, (2) DETERMINING THE NUMBER OF FUEL PINS REQUIRED TO MAINTAIN SPECIFIED HEAT FLUX MARGINS FROM BURNOUT AT A GIVEN REACTOR POWER LEVEL, (3) DETERMINING THE DIAMETER OF A FUEL PIN TO DESIGN WITHIN FUEL CENTERLINE TEMPERATURE LIMITS AT A SPECIFIED REACTOR POWER LEVEL, (4) EVALUATING THE SINTERING EFFECT ON FUEL TEMPERATURE, (5) CALCULATING PRESSURE DROP AND COOLANT PROPERTIES FOR SINGLE-PHASE AND TWO-PHASE FLOW FOR FUEL OPERATING AT AVERAGE REACTOR CONDITIONS AND A THEORETICAL HOT PIN HOT CHANNEL CONDITION, AND (6) CALCULATING PRESSURE DROP ACROSS SEVERAL TYPES OF FUEL PIN SPACERS.

487 STEAM-67 STEAM-67 IS A SET OF ROUTINES FOR CALCULATING THE PROPERTIES OF STEAM AND WATER ACCORDING TO THE ASME STEAM TABLES, 1967, WHICH HAVE BEEN MODIFIED IN ACCORDANCE WITH THE ASME PAPER (REFERENCE 3). MODIFICATIONS WERE MADE TO IMPROVE PROGRAM RUNNING TIME AS WELL AS TO CORRECT SOME EXISTING PROGRAM ERRORS. CORRECTIONS WERE ALSO MADE TO ROUTINES FOR THE LIQUID REGION TO IMPROVE ACCURACY ON THE IBM360 COMPUTER.

517 HEATING3 HEATING3 IS DESIGNED TO SOLVE STEADY-STATE AND/OR TRANSIENT HEAT CONDUCTION PROBLEMS IN ONE-, TWO-, OR THREE-DIMENSIONAL CARTESIAN OR CYLINDRICAL COORDINATES. THERMAL CONDUCTIVITY, DENSITY, AND SPECIFIC HEAT MAY BE DEPENDENT ON TEMPERATURE. HEAT GENERATION RATES MAY BE DEPENDENT ON POSITION AND TIME, AND THE BOUNDARY TEMPERATURES MAY BE TIME-DEPENDENT. THE BOUNDARY CONDITIONS MAY BE FIXED TEMPERATURES OR ANY COMBINATION OF CONSTANT HEAT FLUX, FORCED CONVECTION, NATURAL CONVECTION, AND RADIATION. THEY CAN BE FROM SURFACE-TO-BOUNDARY, SURFACE-TO-SURFACE, OR SURFACE-TO-SURFACE PLUS CONDUCTION. THE MESH SPACING CAN BE VARIABLE ALONG EACH AXIS.

525 ORTHIS/ORTHAT ORTHIS AND ORTHAT ARE DESIGNED TO SOLVE STEADY-STATE AND TRANSIENT HEAT CONDUCTION PROBLEMS, RESPECTIVELY, IN TWO-DIMENSIONAL GEOMETRIES. EITHER CARTESIAN (X-Y) OR CYLINDRICAL (R-Z, R-THETA) COORDINATE SYSTEMS MAY BE USED. THERMAL PROPERTIES, HEAT GENERATION RATES, AND BOUNDARY CONDITIONS MAY BE FUNCTIONS OF POSITION, TIME, OR TEMPERATURE.

545 BETTY BETTY DESCRIBES SPATIAL AND TEMPORAL CONCENTRATION BEHAVIOR OF A SUSPENSION IN A PIPE, AS A RESULT OF DEPOSITION AND EROSION OF THE PARTICLES.

551 MOXY/MOD1 MOXY COMPUTES HEAT TRANSFER IN A BOILING WATER REACTOR FUEL ELEMENT. CONDUCTION, CONVECTION, AND RADIATION MODES OF HEAT TRANSFER ARE CONSIDERED, AS WELL AS HEAT ADDITION BY METAL-WATER REACTION. CONVECTION HEAT TRANSFER COEFFICIENTS ARE INPUT AS TABULAR FUNCTIONS OF TIME.

552 PWR-PPM PWR-PPM GENERATES BORATION-DILUTION TABLES USED BY THE REACTOR OPERATOR OF A PWR. THE COMPUTER PRINTED TABLES PLOT INITIAL AND FINAL REACTOR COOLANT SYSTEM BORON CONCENTRATION IN UNITS OF PPM BORON AGAINST THE GALLONS OF MAKEUP WATER AND BORIC ACID SOLUTION REQUIRED TO OBTAIN THE DESIRED PPM CHANGE. THESE TABLES REPLACE NOMOGRAPHS NORMALLY REQUIRED FOR BORATION AND DILUTION OPERATIONS.

560 HYMAS HYMAS GENERATES THE HYDRODYNAMIC MASS MATRIX PER UNIT DEPTH ASSOCIATED WITH A MULTI-MASS SYSTEM IMMERSED IN A LIQUID ENVIRONMENT. IT IS ASSUMED THAT THE LIQUID ENVIRONMENT MAY BE REPRESENTED BY A SERIES OF FLOW-CHANNELS AND NODES. FLOW-CHANNELS ARE INTRODUCED IN THE REGION BETWEEN SURFACES OF NEIGHBORING SOLIDS, AND NODES ARE USED TO CONNECT TWO OR MORE FLOW-CHANNELS. ALSO, IT IS ASSUMED THAT THE SOLID BODIES UNDERGO UNIDIRECTIONAL MOTION, THAT POTENTIAL FLOW THEORY IS APPLICABLE, THAT THE WIDTH OF A FLOW-CHANNEL IS SMALL COMPARED WITH THE LENGTH SO THERE IS NO PRESSURE DROP ACROSS THE FLOW-CHANNEL, AND THAT NODAL VOLUME IS SMALL COMPARED WITH FLOW-CHANNEL VOLUME.

580 ASTEM ASTEM IS A MODULAR SET OF FORTRAN IV SUBROUTINES TO EVALUATE THE GIBBS, HELMHOLTZ, AND SATURATION LINE FUNCTIONS AS PUBLISHED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (1967). ANY THERMODYNAMIC QUANTITY INCLUDING DERIVATIVE PROPERTIES CAN BE OBTAINED FROM THESE ROUTINES BY A USER-SUPPLIED MAIN PROGRAM.

586 PLENUM BULK FLOW DISTRIBUTION IN A CYLINDRICAL REACTOR COOLANT INLET PLENUM IS CALCULATED USING POTENTIAL FLOW THEORY.

616 HAFMAT HAFMAT WAS DEVELOPED FOR THE CALCULATION OF THE STEADY-STATE DISTRIBUTION OF FLOW TO ALL PATHS OF ANY GIVEN FLOW SYSTEM WHEN THE FLOW GEOMETRY AND HEAT ADDITION ARE SPECIFIED FOR EVERY FLOW PATH AND THE SYSTEM BOUNDARY CONDITIONS ARE DEFINED. THE SYSTEM IS CONSIDERED AS A NETWORK OF FLOW PATHS OR PIPES.

618 GAPCON-THERMAL1 THE GAPCON-THERMAL1 PROGRAM PROVIDES A METHOD FOR CALCULATING THE GAP CONDUCTANCE IN OXIDE FUEL PINS. FUEL AND CLADDING TEMPERATURES, AND INTERNAL PRESSURES ARE CALCULATED AS A FUNCTION OF BURNUP FROM INPUT COOLANT CONDITIONS, POWER SHAPES, AND ROD GEOMETRIES.

629 ORRIBLE ORRIBLE IS A GROUP OF PROGRAMS USED TO PREDICT FLOW AND TEMPERATURE DISTRIBUTION FOR STEADY SINGLE-PHASE FLOW THROUGH BUNDLES OF HEATED RODS SEPARATED BY HELICAL WIRE-WRAP SPACERS. ANY COMBINATION OF FLOW SUBCHANNELS CAN BE BLOCKED AT THE INLET. TURBULENT INTERACTION, SWEEPING CROSS FLOW DUE TO THE WIRE WRAP, AND TRANSVERSE THERMAL CONDUCTION ARE CONSIDERED. THE ELEVEN ORRIBLE PROGRAMS IN THE PACKAGE ARE FOR THREE DUCT CONFIGURATIONS OF 19-ROD BUNDLES, AND FOR 37-, 91-, AND 217-ROD BUNDLES IN HEXAGONAL DUCTS. IN THREE VERSIONS, PERIODIC CHANNEL AREA VARIATIONS DUE TO THE WIRE WRAPS MOVING THROUGH CHANNELS AND THE POSSIBILITY OF THE ROD BUNDLE FORMING A HELIX IN THE DUCT ARE CONSIDERED.

636 6KILER 6KILER WAS DEVELOPED FOR PREDICTIVE AND POST-TEST ANALYSES OF CORE HEAT TRANSFER DURING A LOSS-OF-COOLANT ACCIDENT FOR A GENERAL ELECTRIC BWR/6 TYPE NUCLEAR REACTOR PLANT.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

48 FUGUE THE FUGUE PROGRAM COMPUTES STEADY-STATE WALL AND BULK FLUID TEMPERATURE, VOID FRACTION, AND LOCAL PRESSURE IN LIQUID-COOLED CLOSED CHANNELS IN WHICH THE HEATING RATE IS SPECIFIED. THE REQUIRED RELATIONSHIPS ARE EXPRESSED IN GENERAL, NON-DIMENSIONAL FORM AND COMBINED IN AN INTERNALLY CONSISTENT MANNER TO ALLOW PREDICTIONS FOR A VARIETY OF COOLANTS AND SPECIFIED OPERATING CONDITIONS.

80 SOR3 SOR3 IS USED FOR THE ANALYSIS OF SYMMETRICALLY LOADED SHELLS OF REVOLUTION. THE PROGRAM COMPUTES STRESSES, STRAINS, FORCES AND DEFLECTIONS PRODUCED BY THERMAL AND MECHANICAL LOADS. NORMAL AND TRANSVERSE SHEAR STRESSES AND WALL THICKNESS CHANGES ARE TAKEN INTO ACCOUNT. THE PROGRAM IS BASED ON CONSTITUTIVE EQUATIONS WHICH RETAIN TERMS THROUGH THE SECOND ORDER IN THE RATIO OF THE THICKNESS TO THE LOCAL RADII OF CURVATURE. THESE FEATURES MAKE THE PROGRAM APPLICABLE TO SHELL STRUCTURES WITH MODERATELY LARGE THICKNESS TO RADIUS RATIOS.

109 4RESTRAINT PIPE STRESS CODE THIS PROGRAM EVALUATES A FOUR RESTRAINT PIPING SYSTEM DESIGNED FOR HIGH TEMPERATURE OPERATION.

112 CROCK CROCK SELECTS THE MINIMUM WEIGHT DESIGN FOR A SPACE POWER PLANT IN WHICH THE WASTE CYCLE HEAT IS RADIATED DIRECTLY TO SPACE FROM THE CONDENSER. IT ACCOUNTS FOR HEAT TRANSFER, FLUID FLOW, METEOROID PROTECTION, AND THE GEOMETRIC PROPERTIES OF A RADIATOR-CONDENSER.

114 SHOCK SHOCK SELECTS THE MINIMUM WEIGHT DESIGN FOR A HEAT-REJECTION SYSTEM FOR A SPACE POWER PLANT IN WHICH THE SENSIBLE HEAT LOST FROM A SINGLE-PHASE FLUID IS RADIATED TO SPACE. IT ACCOUNTS FOR HEAT TRANSFER, FLUID FLOW, METEOROID PROTECTION AND RADIATOR GEOMETRY.

187 CENTRIFUGAL PUMP IMPELLER DESI THIS SYSTEM HAS BEEN DEVELOPED FOR THE DESIGN AND DEVELOPMENT OF HIGH SPEED TURBOMACHINERY FOR PUMPING HIGH TEMPERATURE LIQUID METALS. AFTER INITIALING THE ANALYSIS AND DESIGN EFFORT BY ESTABLISHING THE PUMP CONDITIONS OF SERVICE THE CODES ARE USED TO DEFINE THE PUMP IMPELLER DESIGN. IN ALL PROGRAMS, REAL FLUID EFFECTS ARE NOT CONSIDERED. THE MACHINING CODE PRODUCES A PAPER TAPE FOR USE IN THE ACTUAL FABRICATION OF THE IMPELLER.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

190 WCPEXPRT, WEIGHT OPTIMIZATION THE PURPOSE OF THE CODE IS TO CHOOSE THE LIGHTEST REACTOR RESULTING FROM ALL POSSIBLE COMBINATIONS OVER THE RANGE OF REACTOR INDEPENDENT VARIABLES SPECIFIED. THE ENGINEERING CALCULATIONS FOR EACH REACTOR DESIGN ARE BASED ON A LIQUID-COOLED CYLINDRICAL REACTOR HAVING PIN-TYPE FUEL ELEMENTS. REACTOR CONTROL IS ASSUMED TO BE EFFECTED BY MOVABLE SIDE REFLECTORS SURROUNDING THE CORE. NECESSARY PHYSICS DATA IS INPUT IN THE FORM OF SECOND-DEGREE EQUATIONS AS A FUNCTION OF THE INDEPENDENT VARIABLES.

232 GAZELLE5 DETERMINATION OF GAS-COOLED FAST REACTOR CORE PROPERTIONS REQUIRED TO SATISFY SPECIFIED DESIGN CONSTRAINTS AND COMPUTATION OF RESULTING PERFORMANCE CHARACTERISTICS.

233 CORE THE REACTOR CORE CONFIGURATION DESIGNED BY THE CORE PROGRAM CONSISTS OF CYLINDRICAL FUEL ELEMENTS ARRANGED ON AN EQUILATERAL PITCH SPACING WITH INTERNAL AND EXTERNAL COOLING. THE FUEL ELEMENT IS COMPOSED OF THREE CONCENTRIC GRAPHITE RINGS, AN INTERNAL COOLANT CHANNEL, AND A SPINE. THE COOLANT CHANNEL IS FORMED BY THE SPINE AND INNER GRAPHITE RING. THE FUEL IS CONTAINED IN THE MIDDLE GRAPHITE RING. CORE WILL DETERMINE THE NUMBER OF FUEL ELEMENTS OF A SPECIFIED DIAMETER AND LENGTH REQUIRED TO SATISFY A GIVEN CENTRAL FUEL TEMPERATURE. IT ALSO ADJUSTS THE PITCH SPACING REQUIRED TO PRODUCE A DESIRED PRESSURE DROP AS WELL AS PROVIDING A SPECIFIED INTERNAL COOLING RATE.

244 CYCLOPS1 CYCLOPS1 IS A PROGRAM FOR THE ANALYSIS OF THERMODYNAMIC SYSTEMS. IT IS A GENERAL PURPOSE PROGRAM THAT PERFORMS A HEAT AND MASS BALANCE FOR THERMODYNAMIC SYSTEMS COMPOSED OF PUMPS, TURBINES, SEPARATORS, HEAT EXCHANGERS, COMPRESSORS AND FLOW THROTTLING DEVICES. THESE COMPONENTS MAY BE CONNECTED IN ANY DESIRED WAY. THE THERMODYNAMIC FLUIDS THAT MAY BE USED ARE WATER, AIR, NITROGEN, AND PARA-HYDROGEN.

250 SAFE-PCRS SAFE-PCRS NUMERICALLY DETERMINES THE STRESS AND STRAIN DISTRIBUTION WITHIN EITHER HOMOGENEOUS OR HETEROGENEOUS THICK-WALLED BODIES OF REVOLUTION. IT IS DESIGNED FOR THE ANALYSIS OF MULTI-MATERIAL AXISYMMETRIC COMPOSITE STRUCTURES SUCH AS REINFORCED AND/OR PRESTRESSED CONCRETE VESSELS. DEFORMATIONS MUST BE WITHIN THE ELASTIC LIMIT OF THE MATERIALS CONSIDERED AND ONLY BODIES OF REVOLUTION SUBJECTED TO AXISYMMETRIC LOADING CAN BE TREATED.

I. DEFORMATICN AND STRESS DISTRIBUTICN CCMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

251 SAFE-AXISYM SAFE-AXISYM IS A PROGRAM FOR THE ANALYSIS OF MULTI-MATERIAL AXISYMMETRIC COMPOSITE STRUCTURES. IT IS DESIGNED FOR THE ANALYSIS OF HETEROGENEOUS STRLCTURES SUCH AS REINFORCED AND/OR PRESTRESSED CONCRETE VESSELS. THE STRUCTURE IS ASSUMED TC BE LINEARLY ELASTIC, AND ONLY BODIES OF REVOLUTICN SUBJECTED TO AXISYMMETRIC LOADING CAN BE TREATED.

252 SAFE-PLANE SAFE-PLANE IS APPLIED TO TWO-DIMENSIONAL STRUCTURES OF ARBITRARY GEOMETRY UNDER IN-PLANE LOADS. EITHER PLANE STRESS OR PLANE STRAIN CONDITIONS MAY BE IMPOSED. MECHANICAL AND/OR THERMAL LOACS ARE PERMITTED.

253 SAFE-SHELL SAFE-SHELL IS USED TO DESIGN AND ANALYZE AXISYMMETRIC THIN SHELL STRUCTURES OF ARBITRARY GENERATRICES UNDER AXISYMMETRIC MECHANICAL AND/OR THERMAL LOADING CONDITICNS. THE INTERSECTICN OF TWC CR MORE SHELLS CAN BE TREATED.

266 CYGRO2 CYGRO2 IS USEC TO DETERMINE STRESSES AND STRAINS DURING STEADY-STATE AND TRANSIENT POWER OPERATICN OF AN OXIDE-FUELED, METAL CLAD ROD-TYPE FUEL ELEMENT IN A PRESSURIZED ENVIRONMENT. MAJCR LOADING CONDITIONS INCLUDE FUEL SWELLING, FISSION GAS ANC COOLANT PRESSURE, CLAD GRCWTH AND DIFFERENTIAL THERMAL EXPANSICN. THE APPLICATION FOR WHICH THE PRCGRAM HAS BEEN DEVELOPED IS ZIRCALOY TUBES CONTAINING BULK OXIDE FUEL. AXIAL AND AZIMUTHAL SYMMETRY CF TEMPERATURE AND STRESSES IS ASSUMED.

282 SEALSHELL2 (MO110) THE SEALSHELL2 FROGRAM DETERMINES STRESSES, STRAINS, DEFLECTIONS, AND REACTICNS IN A THICK SHELL OF REVCLUTION WITH AXISYMMETRIC LOADING. THE LCADING CONSISTS OF A TEMPERATURE DISTRIBUTION, INSIDE AND CUTSIDE PRESSURE DISTRIBUTIONS, ANC CIRCUMFERENTIAL FCRCES AND MOMENTS APPLIED TO THE MIDDLE SURFACE. THE SHELL IS LINEAR-ELASTIC WITH TENSILE, BENDING, AND SHEAR STRAINS.

283 MO552 MO552 SOLVES THE TRANSIENT RESPONSE PROBLEM CF LINEAR ELASTIC, LUMPED-MASS SYSTEMS SUBJECTED TC A UNIDIRECTIONAL FCUNDATICN TRANSIENT THAT CAN BE EITHER A VELOCITY OR ACCELERATICN TRANSIENT. NORMAL MCDE THECRY IS USEC AND THE INPUT TO THE PROGRAM CONSISTS OF THE MODE SHAPES, FREQUENCIES, AND FCUNDATION TRANSIENT. ELEMENT EFFECTS ARE ALSO EVALUATED AS A FUNCTION OF TIME. MODAL DAMPING COEFFICIENTS MAY BE SPECIFIED.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

300 SAFE-CREEP SAFE-CREEP PERFORMS A VISCO-ELASTIC ANALYSIS OF PLANE OR AXISYMMETRIC COMPOSITE CONCRETE STRUCTURES WITH AGE- AND TEMPERATURE-DEPENDENT CREEP DATA.

315 WIREX WIREX PRODUCES WIRING LISTS CONTAINING ALL THE INFORMATION NORMALLY FOUND ON DETAILED WIRING DRAWINGS. THESE LISTS ARE PRESENTED TO THE ELECTRICIANS AS A JOB BOOK CONTAINING INFORMATION IN THE ORDER IN WHICH IT IS REQUIRED FOR LOGICAL PROCEDURE THROUGH A WIRING JOB. WIREX LISTS WERE USED EXTENSIVELY DURING INSTALLATION FOR THE UHTREX PROJECT.

329 M0457(PIPE) PIPE PERFORMS AN ELASTIC STRESS ANALYSIS OF A 3-DIMENSIONAL PIPING STRUCTURE WITH THERMAL STRESSES, REDUNDANT LOOPS, AND CONCENTRATED LOADS.

332 SAFE-3D SAFE-3D IS A FINITE-ELEMENT PROGRAM FOR THE THREE-DIMENSIONAL ELASTIC ANALYSIS OF HETEROGENEOUS COMPOSITE STRUCTURES. THE PROGRAM USES THE FOLLOWING TYPES OF FINITE ELEMENTS - (1) TETRAHEDRAL ELEMENTS TO REPRESENT THE CONTINUUM, (2) TRIANGULAR PLANE STRESS MEMBRANE ELEMENTS TO REPRESENT INNER LINER OR OUTER CASE, AND (3) UNIAXIAL TENSION-COMPRESSION ELEMENTS TO REPRESENT INTERNAL REINFORCEMENT. THE STRUCTURE CAN BE OF ARBITRARY GEOMETRY AND HAVE ANY DISTRIBUTION OF MATERIAL PROPERTIES, TEMPERATURES, SURFACE LOADINGS, AND BOUNDARY CONDITIONS.

337 STEM STEM CALCULATES AND PUNCHES OUT PARTIALLY-COUPLED MASS, STIFFNESS AND INTERNAL LOAD FUNCTION MATRICES FOR A STRUCTURAL SYSTEM OF BEAMS HAVING PRISMATIC SEGMENTS. SHEAR DEFORMATION AND ROTATIONAL INERTIA ARE INCLUDED IN THE CALCULATIONS.

344 GEM GEM IS INTENDED PRIMARILY TO PERFORM VIBRATION STUDIES WITH THE CAPABILITY OF GENERATING INPUT FOR THE VEP (VIBRATION EIGENVALUE PROBLEM) ROUTINE AND PERFORMING ADDITIONAL OPERATIONS ON THE OUTPUT FROM THE SHO (SHOCK) SEGMENT. GIVEN A SYSTEM OF MASSES AND SPRINGS, THE VEP ROUTINE COMPUTES THE NATURAL FREQUENCIES OF THE VIBRATING SYSTEM AS WELL AS THE MODE SHAPES FOR EACH FREQUENCY. GIVEN THE MODE SHAPES, FREQUENCIES, AND MASSES OF A VIBRATING SYSTEM, THE SHO ROUTINE WILL COMPUTE THE DEFLECTIONS AND FORCES AT THE MASS POINTS.

353 SWELL2 SWELL2 WAS DEVELOPED TO PROVIDE THE FUEL-ELEMENT LIFETIME DATA REQUIRED FOR POWER PLANT OPTIMIZATION STUDIES. THE PROGRAM COMMENCES BY CALCULATING RADIAL AND AXIAL TEMPERATURES IN A FUEL ELEMENT. THE FUEL WHICH IS HOTTER THAN THE EFFECTIVE-FISSION-GAS-RELEASE-TEMPERATURE IS CONSIDERED TO RELEASE ITS FISSION GAS IMMEDIATELY TO A PLENUM, AND THE PRESSURE OF ALL PLENUM GAS IS CALCULATED. THE PRESSURE OF THE GAS RETAINED FOR A WHILE IN THE COLDER FUEL IS ALSO CALCULATED. AT EACH AXIAL POSITION THE PLENUM PRESSURE IS COMPARED WITH THE PRESSURE EXERTED BY RETAINED FISSION GAS, AND THE LARGER OF THE TWO PRESSURES IS CONSIDERED TO BE THE EFFECTIVE PRESSURE AS FAR AS CLADDING DAMAGE IS CONCERNED. THE CLADDING IS ASSUMED TO FAIL WHEN ITS CUMULATIVE DAMAGE EQUALS UNITY AT ANY AXIAL POSITION. DAMAGE COMPONENTS ARE PRIMARY CREEP, SECONDARY CREEP, RATCHETING GROWTH DUE TO THERMAL CYCLING, FATIGUE DUE TO THERMAL CYCLING, AND STRAIN DUE TO INEXORABLE FUEL SWELLING. AT EACH STEP OF THE CALCULATIONS THE FUEL ELEMENT IS SUBJECTED TO SEVERAL CONDITIONS OF ABNORMAL OPERATION (OVERPOWER, FLOW COASTDOWN, ETC.) TO ENSURE THEY COULD NOT PRODUCE ENOUGH ADDITIONAL DAMAGE TO CAUSE FAILURE AT THAT TIME.

357 SUPORAN SUPORAN SOLVES FOR STEADY-STATE DEFORMATION AND STRENGTH CHARACTERISTICS OF A NUCLEAR REACTOR CORE SUPPORT STRUCTURE. THIS STRUCTURE IS ASSUMED TO BE MADE OF TWO CIRCULAR PLATES WHICH ARE LOCATED ABOVE EACH OTHER AND ARE INTERCONNECTED PERPENDICULARLY WITH CONCENTRIC ROWS OF TUBULAR MEMBERS. THE GEOMETRY OF THE STRUCTURE AND ITS LOADING (TRANSVERSE PRESSURE AND INTERNAL TEMPERATURE GRADIENTS) ARE ALL OF AXISYMMETRICAL NATURE.

365 BOW2 BOW2 IS USED TO CALCULATE DEFLECTIONS OF CLOSELY-SPACED PARALLEL BEAMS, EACH WITH LIMITED-PIVOT SUPPORT AT ONE END, POSSIBLE BEAM INTERACTIONS AT THE OTHER END AND AT ONE INTERMEDIATE POSITION, ASSUMING AN ARBITRARY TEMPERATURE DISTRIBUTION.

378 TUBE TUBE SOLVES FOR THE STRESSES DUE TO PRESSURE AND TEMPERATURE IN A U-TUBE TYPE HEAT EXCHANGER. SPECIFICALLY, IT HANDLES A CONFIGURATION CONSISTING OF A SPHERICAL HEAD, PRIMARY TRANSITION CYLINDER, AND SECONDARY CYLINDER. THE TRANSITION CYLINDERS MAY BE CONICAL AND TAPERED IN THICKNESS, BUT THE REMAINING SHELLS ARE OF UNIFORM THICKNESS. THE SPHERICAL HEAD AND THE TRANSITION CYLINDERS MAY BE OMITTED FROM A PROBLEM.

379 SAFE-2D SAFE-2D PERFORMS THE ELASTIC STRESS ANALYSIS OF GENERAL AXISYMMETRIC, PLANE, AND COMBINED AXISYMMETRIC AND PLANE COMPOSITE STRUCTURES.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

383 MO266 MO266 COMPUTES THE DYNAMIC SHOCK FORCES AND MODAL FREQUENCIES ACTING ON A LUMPED MASS, LINEAR ELASTIC MODEL OF A STRUCTURE SUBJECTED TO SHOCK SPECTRUM INPUTS. THE MODEL EMPLOYED IS A COLLECTION OF LUMPED MASSES CONNECTED BY WEIGHTLESS FLEXIBLE ELEMENTS. IF THE ORIGINAL STRUCTURE IS NOT STATICALLY DETERMINATE, REDUNDANT FORCES MUST BE INTRODUCED TO ENSURE A PRIMARY STRUCTURE THAT IS.

391 SORSDB SORSDB WAS WRITTEN TO CALCULATE THE STRESS INTENSITIES AND FATIGUE USAGE FACTORS FOR PRESSURE VESSELS (STRUCTURAL MEMBERS) IN ACCORDANCE WITH THE ASME CODE, NUCLEAR VESSELS, SECTION 3. THE INPUT REQUIRES THE BASIC MEMBRANE AND BENDING STRESSES GENERATED BY THE SOR2 CODE (ACC ABSTRACT 80) OR ANY ADAPTABLE SHELL PROGRAM. THE OUTPUT INCLUDES STRESS DIFFERENCES, STRESS INTENSITIES, AND FATIGUE USAGE FACTORS.

402 SABOR4 SABOR4 IS A DISCRETE ELEMENT DISPLACEMENT PROGRAM FOR THE LINEAR-ELASTIC, STATIC, LOAD-DEFLECTION ANALYSIS OF MERIDIONALLY-CURVED, VARIABLE-THICKNESS, BRANCHED, THIN SHELLS OF REVOLUTION WHICH MAY BE SUBJECTED TO CONCENTRATED OR DISTRIBUTED EXTERNAL LOADING AND TO ISOTHERMAL OR NONUNIFORM TEMPERATURE CONDITIONS. THE PROGRAM CONSISTS OF FIVE PRIMARY SUBPROGRAMS - HAL4, MELT4, LANCE4, MAINS4, AND SUMPLOT4. THREE OF THESE (HAL4, MELT4, AND LANCE4) PROCESS EXTERNAL-MECHANICAL-LOAD OR THERMAL-LOAD DATA TO DETERMINE THE GENERALIZED NODAL FORCES FOR EACH DISCRETE ELEMENT. MAINS4 COMPUTES THE DISCRETE-ELEMENT STIFFNESS AND MASS MATRICES AND FORMS THESE MATRICES FOR THE ASSEMBLED STRUCTURE. SUMPLOT4 CALCULATES THE OTHER QUANTITIES OF INTEREST, SUMS CONTRIBUTIONS FROM VARIOUS LOADING HARMONICS, AND PREPARES RESULTS FOR CALCOMP PLOTTING.

404 FINEL FINEL IS A COLLECTION OF 3 PROGRAMS FOR THE CALCULATION OF THE ELASTIC AND PLASTIC BEHAVIOR OF STRUCTURES. THE STRUCTURES ARE BUILT UP FROM PLATES AND BARS, WHICH CAN BE ARRANGED IN EITHER 2-DIMENSIONAL OR 3-DIMENSIONAL ASSEMBLIES. THE PLATES CAN BE IN PLANE STRESS OR PLANE STRAIN. FINEL2 HANDLES 2-D STRUCTURES ONLY. FINEL3 CAN HANDLE BOTH 2- AND 3-D STRUCTURES, BUT IS SLOWER.

412 MANE1 THE MANE1 PROGRAM FINDS THE MAGNETIC FLUX IN EACH BRANCH OF A MAGNETIC NETWORK CONSISTING OF A NUMBER OF BRANCHES OF IRON AND AIR. THE PROBLEM IS ONE STEP IN THE DESIGN OF SLOW SPEED RELUCTANCE MOTORS IN WHICH THE MAGNETIC FLUX IS DETERMINED IN ALL COMPONENT PARTS FOR A POSITION OF THE ROTOR WITH RESPECT TO THE STATOR.

449 CYGRO3 CYGRO3 IS AN EXTENSIVE MODIFICATION OF CYGRO1 AND CYGRO2 (ACC ABSTRACT 266). BASICALLY THE PROGRAM CALCULATES TEMPERATURES, DEFORMATION, AND STRESSES IN CLADDED FUEL RODS AS A FUNCTION OF A HISTORY OF POWER AND COOLANT CONDITIONS. AXIAL AND CIRCUMFERENTIAL UNIFORMITY ARE ASSUMED. BUBBLE GROWTH AND MIGRATION ARE INCLUDED. THE MAIN CHANGES FROM CYGRO1 AND CYGRO2 ARE IN THE AREA OF VOID MIGRATION, FUEL CRACKING, CLAD COLLAPSE, REPRESENTATION OF IN-PILE CREEP AND CLAD ANISOTROPY.

451 SAFE-CRACK SAFE-CRACK PERFORMS A VISCOELASTIC ANALYSIS OF PLANE AND AXISYMMETRIC COMPOSITE CONCRETE STRUCTURES SUBJECTED TO TRANSIENT TEMPERATURE AND MECHANICAL LOADINGS. THE SPECIFIC CREEP OF CONCRETE AS AN AGE AND TEMPERATURE DEPENDENT FUNCTION, AND CONCRETE FAILURE UNDER COMBINED STRESSES ARE CONSIDERED. PARTICULAR EMPHASIS IS PLACED ON THE CRACKING ANALYSIS IN CONCRETE STRUCTURES AND THE NONLINEAR DEPENDENCE OF CREEP PROPERTY ON TRANSIENT TEMPERATURE.

452 SHELL5 SHELL5 PERFORMS AN ELASTIC STRESS ANALYSIS OF SMOOTHLY CURVED, ARBITRARILY SHAPED, THREE-DIMENSIONAL THIN SHELLS WITH ANY DESIRED DISTRIBUTIONS OF MATERIAL PROPERTIES, BOUNDARY CONSTRAINTS, AND MECHANICAL, THERMAL, AND DISPLACEMENT LOADING CONDITIONS.

460 LIFE1 LIFE1 IS DESIGNED TO PREDICT THE IN-PILE BEHAVIOR OF CYLINDRICAL FAST REACTOR FUEL ELEMENTS. ASSUMING AXIAL SYMMETRY, THE GENERALIZED PLANE-STRAIN ANALYSIS COMBINES MODELS FOR FUEL RESTRUCTURING, MIGRATION OF FUEL CONSTITUENTS, FUEL SWELLING DUE TO ACCUMULATION OF FISSION PRODUCTS, FISSION GAS RELEASE, HOT PRESSING OF THE FUEL, AND CLAD SWELLING DUE TO VOID NUCLEATION AND GROWTH. AN ITERATIVE PROCEDURE ALLOWS THE CODE TO COMPUTE THE DETAILED THERMAL AND MECHANICAL RESPONSE OF THE FUEL ELEMENT DURING ANY SPECIFIED HISTORY OF NORMAL REACTOR POWER CYCLING. UP TO 10 AXIAL SECTIONS ARE ALLOWED TO ACCOUNT FOR VARIATIONS IN POWER AND COOLANT TEMPERATURE, AND AN OPTION IS INCLUDED FOR TREATMENT OF ENCAPSULATED ELEMENTS.

468 BUBL1 BUBL1 PREDICTS FUEL SWELLING AND FISSION GAS RELEASE FROM NUCLEAR FUELS, BASED ON MOVEMENT OF FISSION GAS BUBBLES IN SOLIDS BY A SURFACE DIFFUSION MECHANISM UNDER THE ACTION OF A THERMAL GRADIENT (SEE REFERENCE 3). INTERACTIONS OF THE BUBBLES WITH DISLOCATIONS AND GRAIN BOUNDARIES PROVIDE TEMPORARY TRAPPING SITES, PRIOR TO RELEASE.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

481 BUSHL BUSHL DETERMINES THE LOAD AT WHICH A FINITE LENGTH SHELL OF REVOLUTION WILL BUCKLE WHEN SUBJECTED TO HYDROSTATIC PRESSURE, AXIAL COMPRESSION, OR A COMBINATION OF THE TWO. ELASTIC-PLASTIC MATERIAL PROPERTIES ARE USED WITH DEFORMATION THEORY AND THIN SHELL THEORY TO ANALYZE THE SHELL. BUSHL WAS DEVELOPED PRIMARILY FOR THE BUCKLING COLLAPSE ANALYSIS OF ZIRCALOY-CLAD OXIDE FUEL RODS.

503 DUZ2 DUZ2 PERFORMS TWO-DIMENSIONAL ELASTIC-PLASTIC STRESS CALCULATIONS. THE PROGRAM TREATS AXIALLY SYMMETRIC BODIES OR PLANE REGIONS (PLANE STRESS OR PLANE STRAIN) ASSUMING DEFORMATION THEORY. LOADING CONDITIONS MAY BE A NON-UNIFORM TEMPERATURE DISTRIBUTION, BODY FORCES, AND BOUNDARY DISPLACEMENTS OR STRESSES.

537 MO678(FUGIT1) FUGIT1 PERFORMS A TRANSIENT STEP ANALYSIS OF AN ELASTIC STRUCTURE MOUNTED ON A RIGID BASE WHICH HAS A GIVEN SHOCK HISTORY OF MOTION. THE STRUCTURE MAY HAVE NONLINEAR CONSTRAINTS AND DAMPING.

539 STRAP THE CODE STRAP (STRUCTURAL ANALYSIS PACKAGE) WAS DEVELOPED TO ANALYZE THE RESPONSE OF STRUCTURAL SYSTEMS TO STATIC AND DYNAMIC LOADING CONDITIONS. STRAP-S SOLVES FOR THE DISPLACEMENTS AND MEMBER FORCES OF STRUCTURAL SYSTEMS UNDER STATIC LOADS AND TEMPERATURE GRADIENTS. STRAP-D WILL SOLVE NUMERICALLY A GIVEN STRUCTURAL DYNAMICS PROBLEM.

542 PSA2 PSA2 COMPUTES THE REACTIONS AND STRESSES CAUSED BY THERMAL EXPANSION AND LOADS IN A MULTI-ANCHOR PIPING SYSTEM WHICH MAY CONTAIN LOOPS AND MAY BE PARTIALLY RESTRAINED AT ANY POINT IN ANY DIRECTION.

568 BEHAVE2 BEHAVE2 CALCULATES THE POSITION IN SPACE OF CLADDING, FUEL, AND VOIDAGE IN AN OPERATING OXIDE FUEL PIN WITH UNFAILED CLADDING. AXIAL SYMMETRY IS ASSUMED THROUGHOUT THE PROGRAM. ALSO CALCULATED ARE STRESS, STRAIN, DISPLACEMENT, AND TEMPERATURE FIELDS. INFLUENTIAL PROCESSES SIMULATED INCLUDE CRACKING OF FUEL, DILATATION OF FUEL AND CLADDING DUE TO IRRADIATION EFFECTS AND THERMAL EXPANSION, FUEL DENSIFICATION BY BOTH STRESS- AND DIFFUSION-CONTROLLED PROCESSES, AXIAL SLIPPAGE OR LOCKING AT THE FUEL-CLADDING INTERFACE AND AXIAL FLOW OF FUEL.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

570 STRIPE(M0650) STRIPE EXAMINES THE DEFORMATIONS IMPOSED ON THE CLADDING OF CYLINDRICAL FUEL ELEMENTS DUE TO DIFFERENTIAL THERMAL EXPANSIONS DURING ABRUPT POWER INCREASES. THE TITLE IS TAKEN FROM STRESSES AND CRACKING IN PELLETS. THE CALCULATIONAL MODEL INCLUDES EFFECTS OF PELLET CRACKING, THE CONSTRAINT OF SYSTEM PRESSURE AND CLADDING, COMPRESSIVE PLASTIC FLOW IN THE FUEL AND THE TEMPERATURE DEPENDENCE OF MATERIAL PROPERTIES.

581 SLADE-D SLADE-D ANALYZES THE TRANSIENT DYNAMIC RESPONSE OF ELASTIC SHELLS.

597 MATUS MATUS PERFORMS SMALL-STRAIN ELASTIC ANALYSIS OF THREE-DIMENSIONAL SOLIDS.

598 PELEN PELEN SOLVES A TWO-DIMENSIONAL, AXISYMMETRICAL MODEL OF A FUEL PELLET AND CLAD ELEMENT FOR THE TEMPERATURE, STRESS, AND DEFORMATION THROUGHOUT A TIME HISTORY. IN A GENERAL TIME INCREMENT, THE COMPUTATIONAL SEQUENCE IS - (1) A HEAT CONDUCTION ANALYSIS OF BOTH FUEL AND CLAD TO DETERMINE THE CURRENT TEMPERATURE FIELD WHICH IS DEPENDENT ON THE POWER RATE, THE MATERIAL PROPERTIES, AND THE GEOMETRICAL CONFIGURATION, (2) AN INCREMENTAL STRESS ANALYSIS OF BOTH FUEL AND CLAD TO DETERMINE THE CURRENT STRESS AND DEFORMATION FIELDS WHICH ARE DEPENDENT ON THE INELASTIC STRAIN INCREMENTS (TEMPERATURE, CREEP, VOLUME EXPANSION, ETC.), THE MATERIAL PROPERTIES, AND THE GEOMETRICAL CONFIGURATION, AND (3) A CONTACT ANALYSIS OF BOTH FUEL AND CLAD TO DETERMINE THE CORRECTED CURRENT STRESS AND DEFORMATION FIELDS WHICH ARE DEPENDENT ON THE EXTENT OF CONTACT BETWEEN ADJACENT FUEL PELLETS AND/OR THE FUEL AND CLAD.

604 TCB01 A TUBE UNDER EXTERNAL PRESSURE, AT ELEVATED TEMPERATURE, AND INITIALLY OUT-OF-ROUND WILL CREEP, BECOMING MORE OUT-OF-ROUND AND EVENTUALLY WILL COLLAPSE. TCB01 ATTEMPTS TO PREDICT THE TIME OF COLLAPSE.

611 CHILES CHILES IS A FINITE ELEMENT COMPUTER PROGRAM THAT CALCULATES THE STRENGTH OF SINGULARITIES IN LINEAR ELASTIC BODIES. PLANE STRESS, PLANE STRAIN AND AXISYMMETRIC CONDITIONS ARE TREATED. CRACK TIP SINGULARITY PROBLEMS ARE SOLVED BY THIS VERSION OF THE CODE, BUT ANY TYPE OF INTEGRABLE SINGULARITY MAY BE PROPERLY MODELED BY MODIFYING SELECTED SUBROUTINES IN THE PROGRAM.

I. DEFORMATION AND STRESS DISTRIBUTION COMPUTATIONS, STRUCTURAL ANALYSIS, AND ENGINEERING DESIGN STUDIES 4/75

641 SAP4 SAP4 IS A STRUCTURAL ANALYSIS PROGRAM FOR DETERMINING THE STATIC AND DYNAMIC RESPONSE OF LINEAR SYSTEMS. THE STRUCTURAL SYSTEMS TO BE ANALYZED MAY BE COMPOSED OF COMBINATIONS OF A NUMBER OF DIFFERENT STRUCTURAL ELEMENTS. PRESENTLY, THE PROGRAM CONTAINS THE FOLLOWING ELEMENT TYPES -

(A) THREE-DIMENSIONAL TRUSS ELEMENT,
(B) THREE-DIMENSIONAL BEAM ELEMENT,
(C) PLANE STRESS AND PLANE STRAIN ELEMENT,
(D) TWO-DIMENSIONAL AXISYMMETRIC SOLID,
(E) THREE-DIMENSIONAL SOLID,
(F) VARIABLE-NUMBER-NODES THICK SHELL AND THREE-DIMENSIONAL ELEMENT,
(G) THIN PLATE OR THIN SHELL ELEMENT,
(H) BOUNDARY ELEMENT, AND
(I) PIPE ELEMENT (TANGENT AND BEND).

643 NUBOW NUBOW PERFORMS A TWO-DIMENSIONAL ELASTIC ANALYSIS OF REACTOR CORE SYSTEMS SUBJECTED TO THERMAL AND/OR MECHANICAL BOWING. REACTOR ASSEMBLIES ARE CONSIDERED TO BE ELASTIC BEAM MEMBERS WHICH MAY HAVE VARIABLE GEOMETRY. EQUILIBRIUM FORCES AND POSITIONS ARE CALCULATED ALONG WITH THE SHAPES OF INDIVIDUAL ROWS. CLEARANCE AND LOCAL FLEXIBILITY ARE ALLOWED AT ALL CONTACTS.

45 GRACE1 GRACE1 IS A MULTIGROUP, MULTIREGION, GAMMA-RAY ATTENUATION PROGRAM DESIGNED PRIMARILY FOR COMPUTING GAMMA-RAY HEATING AND GAMMA-RAY DOSE RATES IN MULTIREGION FINITE OR SEMI-INFINITE SLAB SHIELDS. A DIFFERENT BUILDUP FACTOR MAY BE SPECIFIED FOR EACH SOURCE REGION CONSIDERED.

46 GRACE2 GRACE2 IS A MULTIGROUP, MULTIREGION, GAMMA-RAY ATTENUATION PROGRAM TO COMPUTE THE TOTAL DOSE RATE OR HEAT GENERATION RATE FROM EITHER A SPHERICAL OR A CYLINDRICAL SOURCE. THE SOURCE, WHICH MAY BE LOCATED IN EITHER THE CENTRAL REGION OF THE SYSTEM OR IN A CONCENTRIC SHELL REGION SURROUNDING IT, MAY BE UNIFORM, EXPONENTIAL, OR HAVE A POLYNOMIAL VARIATION IN THE RADIAL DIRECTION. IN THE CASE OF CYLINDRICAL GEOMETRY, IT MAY ALSO HAVE A POLYNOMIAL VARIATION IN THE AXIAL DIRECTION.

91 FARSE-1A THE PROGRAM COMPUTES THE NEUTRON LEAKAGE FROM A SHIELD ANNULUS. THE REMOVAL CROSS SECTIONS INCORPORATE MULTISCATTERING EFFECTS. DOSE DEPOSIT AT THE TARGET MESH IS THEN DETERMINED FROM THE ANGULAR DISTRIBUTION OF THE LEAKAGE NEUTRONS, INTEGRATED OVER THE SHIELD SURFACE.

110 SCARF2 SCARF2 EVALLATES THE FIRST-ORDER APPROXIMATION OF THE FAST NEUTRON CURRENT AT THE PAY LOAD SURFACE DUE TO NEUTRONS WHICH SCATTER FROM THE RADIATOR FINS. IT USES SNAP GEOMETRY AND IS A COMPLEMENTARY PROGRAM TO FARSE.

111 SCAR1 SCAR1 PERFORMS SINGLE SCATTER RAY TRACING AND EVALUATES SCATTERING FROM A RING. IT IS COMPLEMENTARY TO FARSE.

123 LIPRECAN1 LIPRECAN1 IS A TWO-DIMENSIONAL MONTE CARLO PROGRAM TO COMPUTE THE PENETRATION AND ENERGY DEPOSITION OF NEUTRONS IN PURE HYDROGENOUS MEDIA. THE CODE OFFERS THREE POSSIBLE GEOMETRIES, I. E., CONICAL, CYLINDRICAL AND ONE-DIMENSIONAL INFINITE SLAB GEOMETRY (THIS LATTER OPTION TO THE EXTENT THAT AN INFINITE SLAB MAY BE APPROXIMATED BY A CYLINDER OF LARGE RADIUS). THE CODE MAY BE USED WITH A MONO-DIRECTIONAL POINT OR BEAM SOURCE AND IS MODIFIED EASILY TO HANDLE ANGULAR DISTRIBUTIONS. ISOTROPIC SCATTERING IN THE CENTER OF MASS SYSTEM IS ASSUMED. THE FOLLOWING RESULTS ARE TABULATED WITH EACH SUMMARY -

(A) ENERGY DEPOSITION DISTRIBUTION,
(B) PARTICLE DEPOSITION DISTRIBUTION,
(C) PARTICLE LEAKAGE FRACTION,
(D) PARTICLE ABSORPTION FRACTION,
(E) THE FRACTION OF PARTICLES REACHING THE CUTOFF ENERGY WHICH HAVE NEITHER LEAKED NOR HAVE BEEN ABSORBED,
(F) THE AVERAGE ENERGY PER PARTICLE LEAKING FROM THE SYSTEM,
(G) THE AVERAGE ENERGY PER PARTICLE REMAINING IN THE SYSTEM AS HEAT GENERATION,
(H) THE AVERAGE NUMBER OF COLLISIONS PER HISTORY,
(I) THE TOTAL NUMBER OF HISTORIES CURRENTLY BEING SUMMARIZED,
(J) THE AVERAGE ENERGY DEPOSIT PER HISTORY THROUGH ABSORPTION,
(K) THE AVERAGE ENERGY OF PARTICLES ABSORBED.

141 RATRAP THE RATRAP PROGRAM COMPUTES THE DOSE RATE AT SPECIFIED SPATIAL POINTS ABOUT A SYSTEM OF SNAP GEOMETRY.

142 MORTIMER MORTIMER COMPUTES THE DOSE RATE AT SPECIFIED SPATIAL POINTS ABOUT A SYSTEM OF SNAP GEOMETRY.

143 MAC MAC PERFORMS SLAB GEOMETRY, MULTIGROUP NEUTRON AND GAMMA RAY PENETRATION ANALYSIS FOR A MULTI-REGION REACTOR SHIELD. THE CODE CALCULATES THE FOLLOWING INFORMATION AS A FUNCTION OF DISTANCE THROUGH A REACTOR SHIELD ASSEMBLY -

NEUTRON FLUXES FOR UP TO 35 ENERGY GROUPS,
NEUTRON DOSE RATES,
THE APPROXIMATE NEUTRON SPECTRUM,
GAMMA RAY FLUXES FOR 7 ENERGY GROUPS,
TOTAL GAMMA DOSE RATE, WITH A BREAKDOWN OF THE CONTRIBUTION FROM SOURCES IN EACH REACTOR AND SHIELD REGION,
THE APPROXIMATE GAMMA RAY SPECTRUM.

197 SHOE THE SHOE CODE MAKES USE OF THE METHOD OF STEEPEST DESCENT TO FIND THE DIMENSIONS OF A MINIMUM-WEIGHT, THREE-LAYER SHIELD IN SPHERICAL GEOMETRY. THE WEIGHT MINIMIZATION IS CARRIED OUT SUBJECT TO THE CONSTRAINING CONDITION OF A CONSTANT DOSE RATE AT SOME SELECTED POINT OUTSIDE THE SHIELD.

259 MUSCAT MUSCAT COMPUTES THE INCIDENT SCATTERED NEUTRON CURRENTS AS A FUNCTION OF POSITION WITHIN (1) THE CAVITY FORMED BY TWO TRUNCATED CONCENTRIC SPHERES, (2) THE CAVITY BETWEEN TWO CONCENTRIC CIRCULAR CYLINDERS, OR (3) A CYLINDRICAL CAVITY.

343 M0756(LETO) LETO WILL SOLVE THE GAMMA RAY TRANSPORT AND ENERGY DEPOSITION PROBLEM IN ONE-DIMENSIONAL LAMINAR SLAB GEOMETRY. THE ENERGY GROUP SCHEME IS EMPLOYED TO ACCOUNT FOR PHOTON ENERGY DEGRADATION. AN ARBITRARY EXTERNAL SPATIAL ISOTROPIC SOURCE MAY BE SPECIFIED WITH AN ARBITRARY ENERGY SPECTRUM. THE BOUNDARY CONDITIONS MAY BE (A) FREE BOUNDARIES WITH ARBITRARY INCIDENT, (B) SYMMETRY ON THE LEFT ARBITRARY INCIDENT ON THE RIGHT, AND (C) SYMMETRY ON BOTH ENDS.

429 ASPIS ASPIS COMPUTES THE ENERGY, DOSE AND ENERGY DEPOSITION BUILDUP FACTORS FOR MONOENERGETIC GAMMA RAYS FOR A PLANE ISOTROPIC, PLANE MONODIRECTIONAL, OR PLANE SLANT SOURCE, IN AN ARBITRARY LAMINAR ARRAY.

462 SPAN4 SPAN4 CALCULATES THE FAST NEUTRON DOSE RATE, THERMAL NEUTRON FLUX, GAMMA-RAY FLUX, DOSE RATE, AND ENERGY-ABSORPTION RATE IN RECTANGULAR, CYLINDRICAL, AND SPHERICAL GEOMETRIES BY INTEGRATING APPROPRIATE EXPONENTIAL KERNELS OVER A SOURCE DISTRIBUTION. THE SHIELD CONFIGURATION IS FLEXIBLE - A FIRST-LEVEL SHIELD MESH, USING ANY ONE OF THE THREE GEOMETRIES, IS SPECIFIED. REGIONS OF THIS SAME GEOMETRY OR OF OTHER GEOMETRIES, HAVING THEIR OWN (FINER) MESHES, MAY THEN BE EMBEDDED BETWEEN THE FIRST-LEVEL MESH LINES, DEFINING SECOND-LEVEL SHIELD MESHES. THIS PROCESS IS TELESCOPIC - THIRD-LEVEL SHIELD MESHES MAY BE EMBEDDED BETWEEN SECOND-LEVEL MESH LINES IN TURN. ALL MESHES MAY HAVE VARIABLE SPACING. SOURCES AND DETECTORS MAY BE LOCATED ARBITRARILY WITH RESPECT TO ANY SHIELD MESH. THE SOURCE IS DEFINED BY THE FUNCTION -

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S=S0+S1(A)*S2(B)*S3(C)+S4(A,B)*S3(C)+S5(A,C)*S2(B)+S6(B,C)
  *S1(A)+S7(A,B,C)
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WHERE A, B, AND C REPRESENT COORDINATES. IF ANY FACTOR IS MISSING, THE CORRESPONDING TERMS ARE ZERO. CROSS SECTIONS, BUILDUP FACTORS, STANDARD COMPOSITIONS, ENERGY STRUCTURES, DOSE-CONVERSION FACTORS, INFINITE LINE AND INFINITE PLANE SOURCE KERNELS, AND QUADRATURES ARE CONTAINED IN A LIBRARY OF APPROXIMATELY 10,000 ITEMS.

569 VIEWPIN THE PROGRAM CALCULATES VIEW FACTORS FOR CYLINDRICAL PINS WHENEVER THE PROBLEM CAN BE REPRESENTED TWO-DIMENSIONALLY.

273 THREDES THREDES IS A SCIENTIFIC APPLICATIONS PROGRAMMING SYSTEM. INCORPORATED IN THIS SYSTEM ARE THE NECESSARY MODULES TO PERFORM PARAMETRIC DESIGN STUDIES OF THERMAL REACTORS INCLUDING THE THERMAL CELL HOMOGENIZATION (BAM - ACC ABSTRACT 108), THE FAST SPECTRUM CALCULATION (FORM - ACC ABSTRACT 51), REACTOR DIFFUSION THEORY (FOG - ACC ABSTRACT 28), AND ZERO-DIMENSIONAL BURNUP (KINDLE) CALCULATIONS. THESE MODULES CAN BE USED IN CONJUNCTION WITH ONE ANOTHER OR INDIVIDUALLY.

387 CITATION CITATION IS DESIGNED TO SOLVE PROBLEMS INVOLVING THE FINITE-DIFFERENCE REPRESENTATION OF DIFFUSION THEORY TREATING UP TO THREE SPACE DIMENSIONS WITH ARBITRARY GROUP-TO-GROUP SCATTERING. X-Y-Z, THETA-R-Z, HEXAGONAL-Z, AND TRIAGONAL-Z GEOMETRIES MAY BE TREATED. DEPLETION PROBLEMS MAY BE SOLVED AND FUEL MANAGED FOR MULTI-CYCLE ANALYSIS. EXTENSIVE FIRST-ORDER PERTURBATION RESULTS MAY BE OBTAINED, GIVEN MICROSCOPIC DATA AND NUCLIDE CONCENTRATIONS. STATICS PROBLEMS MAY BE SOLVED AND PERTURBATION RESULTS OBTAINED WITH MICROSCOPIC DATA.

189 SNC CALCULATION OF SN CONSTANTS FOR DSN AND TDC.

193 CSP2A THIS CODE PREPARES 100 GROUP FORWARD AND ADJOINT MACROSCOPIC MIXTURE CROSS SECTIONS FOR SN TYPE CODES. THE 100 GROUP MICROSCOPIC CROSS SECTIONS ARE TAKEN FROM THE CROSS SECTION TAPE WRITTEN BY THE CODE CSP1. THE OUTPUT OF CSP2A IS IN THE FORM OF TWO TAPES, ONE CONTAINING THE FORWARD AND THE OTHER THE ADJOINT MACROSCOPIC CROSS SECTIONS. THE CROSS SECTIONS ARE ALSO PRINTED, IF DESIRED.

194 CSP1 THIS CODE PREPARES 100 GROUP MICROSCOPIC CROSS SECTIONS FOR SN TYPE REACTOR CODES, USING THE GAM2 NUCLEAR DATA TAPE FOR THE CROSS SECTION DATA FOR THE FIRST 99 GROUPS. THE DATA FOR GROUP 100 IS PART OF THE PUNCHED CARD INPUT. THE 100 GROUP SN CROSS SECTIONS, PREPARED BY THE CODE, ARE WRITTEN ON TAPE AND PRINTED, IF DESIRED. THE CROSS SECTIONS ARE FOR THE ISOTROPIC OPTION OF THE SN CODES. THE DIAGONAL TRANSPORT APPROXIMATION HAS BEEN USED IN CALCULATING THE TRANSPORT AND IN-GROUP SCATTERING CROSS SECTIONS. THE CORRECTION TERM USED TO CALCULATE THESE TWO CROSS SECTIONS IS SIMPLY 1/3 OF THE P1 SCATTERING CROSS SECTION. THE NUMBER OF OUT-OF-GROUP SCATTERING TERMS IS OPTIONAL. WHEN LESS THAN THE NUMBER APPEARING ON THE GAM2 TAPE ARE REQUESTED, THE REMAINING TERMS, FOR A GIVEN SOURCE GROUP, ARE SUMMED AND ADDED TO THE LAST DOWN-SCATTERING TERM SAVED. WHEN CROSS SECTIONS ARE LISTED IN THE SN FORMAT, IT IS POSSIBLE THAT ONE OR MORE INTERMEDIATE DOWN-SCATTERING TERMS WILL BE ZERO. WHEN THIS SITUATION ARISES, THE CODE WILL REPLACE THESE INTERMEDIATE ZEROS WITH THE QUANTITY 1.0*10**(-20).

218 GAVER GAVER CALCULATES GROUP AVERAGED CROSS SECTIONS FROM POINTWISE CROSS SECTION DATA FOR THE GAM2 99 FINE-GROUP LIBRARY. THE INPUT DATA ARE USED TO OBTAIN A SET OF INTERPOLATED CROSS SECTIONS, WHERE 20 INTERPOLATED CROSS SECTIONS ARE OBTAINED FOR EACH FINE GROUP. WHERE INPUT DATA DO NOT COVER THE FULL RANGE OF A FINE GROUP, THE GROUP-AVERAGED CROSS SECTION IS SET TO ZERO.

234 OPC OPC PREPARES INPUT DATA FOR TWO-DIMENSIONAL NEUTRONIC CALCULATIONS FROM ENGINEERING DATA. A GENERAL DESCRIPTION OF REGIONS, IN TERMS OF MULTIPLE SUBREGIONS, ALLOWS FOR EXPLICIT CONSIDERATION OF DETAILED STRUCTURAL FORMS. DURING THE TRANSFORMATION OF DATA, GENERAL THERMAL EXPANSIONS ARE INCLUDED. ALSO, CONSIDERABLE DATA CHECKING AND EVALUATION ARE PERFORMED. COMBINED WITH THE FLEXIBLE NARRATIVE INPUT, THESE FEATURES MAKE THE CODE USEFUL IN THE PREPARATION OF ERROR-FREE INPUT FOR COMPLEX PROBLEMS.

296 GRDWRK GRDWRK GENERATES AS PUNCHED OUTPUT THE BASIC FINITE ELEMENT REFERENCE GRID WORK FOR THE SAFE CODES. THIS GENERATED GRID CONSISTS OF TRIANGULAR ELEMENTS AND NODES, UNIAXIAL ELEMENTS, SUCH AS REINFORCEMENT BARS, TENDONS, AND ANCHORS, AND BIAXIAL MEMBRANES, SUCH AS ANY THIN SHELL OR LINER. THE PUNCHED OUTPUT SERVE AS DIRECT INPUT DATA TO THE SAFE CODES.

345 GAND GAND PREPARES THE CROSS SECTIONS NEEDED FOR DETAILED COMPUTATIONS OF NEUTRON ENERGY SPECTRA IN FAST REACTORS FROM A FILE OF BASIC NUCLEAR DATA IN THE ENDF/B FORMAT.

373 BL47 BL47 IS A PLOTTING ROUTINE DESIGNED FOR PLANE STRUCTURES THAT ARE TO UNDERGO STRESS ANALYSIS. POINTS AND LINES ARE INPUT IN VARIOUS PARAMETRIC FORMS, AND CURVED SEGMENTS ARE DRAWN BETWEEN GIVEN POINTS ALONG THE GIVEN LINES. THE PROGRAM MAY BE USED AS A DRAFTING TOOL TO CONSTRUCT ENGINEERING DRAWINGS. BL47 USES THREE POINTS ON A STRAIGHT LINE SEGMENT TO OBTAIN DIMENSIONS FOR SEALSHELL2 (ACC ABSTRACT 282) INPUT DATA.

406 DATATRAN 2-D GEOMETRY INPUT THIS SERIES OF DATATRAN MODULES IS DESIGNED TO FACILITATE THE PREPARATION OF GEOMETRIC INPUT TO 2-DIMENSIONAL FINITE DIFFERENCE PROGRAMS FROM DATA READILY TRANSCRIBED FROM ENGINEERING DRAWINGS AND TO CHECK AND EDIT THE INPUT DATA GENERATED.

530 GENRD GENRD WILL READ AND PROCESS FREE-FORMAT NUMERIC AND HOLLERITH INPUT DATA FROM CARDS.

533 ARC(NUI002) BCD INPUT PROCESSOR MODULE ARC(NUI002) PROCESSES GENERAL NEUTRONICS INPUT DATA SETS FOR SUBSEQUENT USE BY THE NEUTRONICS-COMPUTATIONAL MODULES OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM.

594 ARC-XSEC1 ARC-XSEC1 PROVIDES THE CAPABILITY OF MANIPULATING MULTIGROUP MICROSCOPIC CROSS SECTION DATA IN THE XS.ISO FORMAT TO AFFECT MODIFICATIONS OF THE ISOTOPIC CROSS SECTION COMPONENTS, TO COLLAPSE THE ENERGY GROUP STRUCTURE TO FEWER GROUPS, AND TO HOMOGENIZE MIXTURES INTO MATERIAL AND COMPOSITION LEVEL DATA FOR USE BY THE NEUTRONICS MODULES OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM.

612 QMESH,RENUM QMESH GENERATES MESHES HAVING QUADRILATERAL ELEMENTS ON ARBITRARILY SHAPED TWO-DIMENSIONAL (PLANAR OR AXI-SYMMETRIC) BODIES. THE MAIN INTENDED APPLICATION IS IN FINITE ELEMENT ANALYSIS. A FLEXIBLE HIERARCHAL INPUT SCHEME IS USED TO DESCRIBE BODIES TO QMESH AS COLLECTIONS OF REGIONS. A MESH FOR EACH REGION IS DEVELOPED INDEPENDENTLY, WITH THE FINAL ASSEMBLY AND BANDWIDTH MINIMIZATION PERFORMED BY THE SEPARATE PROGRAM, RENUM.

159 MCMUS MCMUS IS THE PROGRAM USED TO CONSTRUCT AND MAINTAIN THE NEUTRON CROSS SECTION MASTER TAPE DEVELOPED UNDER THE ATOMICS INTERNATIONAL AUTOMATED CROSS SECTION PROGRAM. THE LIBRARY CONTAINS 21 ELEMENTS WITH DATA FOR 11 PARAMETERS IN THE RANGE 0.001 EV TO 10 MEV. MOMUS WILL PERFORM THE FOLLOWING TASKS -

(A) MAKE THE BINARY MASTER TAPE FROM CARDS,
(B) LIST SELECTED ELEMENTS,
(C) UPDATE - ADD, CORRECT AND REPLACE ANY DATA,
(D) MAKE A SHORT TAPE CONTAINING SELECTED ELEMENTS,
(E) PROVIDE GRAPHICAL DISPLAY OF SELECTED DATA, AND
(F) PUNCH MICROSCOPIC DATA.

181 XLIBIT USING THE ANL STANDARD CROSS SECTION DATA CARDS AS INPUT, THE PROGRAM CAN PERFORM THE FOLLOWING OPERATIONS -

(A) PREPARE A LIBRARY TAPE CONSISTING OF THE CROSS SECTION DATA FOR SETS OF MATERIALS, INCLUDING A DIRECTORY GIVING THE SETS ON THE TAPE AND THE MATERIALS IN EACH SET,
(B) GIVEN AN EXISTING LIBRARY TAPE, THE PROGRAM CAN PREPARE A DUPLICATE TAPE OR A MODIFIED TAPE, THE MODIFICATIONS CONSISTING OF THE ADDITION AND DELETION OF SETS, THE ADDITION AND DELETION OF MATERIALS WITHIN A SET, AND THE RE-ORDERING OF THE SETS ON THE TAPE,
(C) ANY OF THE DATA ON A LIBRARY TAPE MAY BE PRINTED, AND THE PROGRAM WILL PUNCH THE CROSS SECTION DATA CARDS THAT WERE USED TO PLACE ANY OF THE MATERIALS OR SETS ON THE TAPE WITH ALTERED SET AND MATERIAL NAMES IF DESIRED.

206 UNPACK UNPACK RETRIEVES NEUTRON CROSS SECTION DATA AND RELATED INFORMATION FROM A SCISRS (BROOKHAVEN NATIONAL LABORATORY) DATA TAPE. THE FORMAT AND STRUCTURE OF THE SCISRS TAPE IS DESCRIBED IN BNL-883 BY FRIEDMAN AND PLATT, JULY 1964.

236 DFSR DATA FILE SERVICE ROUTINES (DFSR) ARE USED TO STORE, DISTRIBUTE, AND CHECK THE DATA ON THE EVALUATED NUCLEAR DATA FILE (ENDF). THERE ARE 6 ROUTINES -

DFSR1 - STORES DATA ON MASTER LIBRARY TAPES.
DFSR2 - PROCESSES REQUESTS FOR DATA BY FINDING THE APPROPRIATE DATA ON THE MASTER TAPES AND COPYING THEM ONTO THE REQUESTORS TAPE.
DFSR3 - CORRECTS DATA ON THE MASTER TAPES.
DFSR4 - COPIES/PRINTS/PUNCHES SELECTED DATA FROM THE MASTER TAPES.
DFSR5 - PRINTS LIST OF DATA RECENTLY ADDED TO MASTER TAPES AND PREPARES A CROSS-REFERENCE LIST OF ALL DATA ON THE MASTER TAPES.
DFSR6 - MAKES COPIES AND CHECKS THE MASTER TAPES.

271 CLIP CLIP IS THE CROSS SECTION LIBRARY PREPARATION AND MAINTENANCE PROGRAM FOR FORM AND THREDES.

350 ETOE ETOE (ENDF/B TO MC**2 DATA CONVERSION) ACCEPTS CROSS SECTION DATA FROM A MODE 2 ENDF/B TAPE (SEE REFERENCE 3) AND PREPARES THE BINARY CROSS SECTION AND LEGENDRE POLYNOMIAL TAPE FOR THE MC**2 CODE WRITTEN BY ARGONNE NATIONAL LABORATORY. THE ETOE PROGRAM PROCESSES FORMATS I, II, AND III ENDF/B DATA TAPES.

351 ECSIL ECSIL (EXPERIMENTAL CROSS SECTION INFORMATION LIBRARY) IS A SYSTEM FOR THE STORAGE, RETRIEVAL, AND DISPLAY OF EXPERIMENTAL NEUTRON DATA. THE HEART OF THE ENTIRE SYSTEM IS THE COLLECTION OF DESIGNATORS USED TO IDENTIFY THE TYPE OF NEUTRON DATA, E.G., WHETHER THE MEASUREMENT IS A FISSION CROSS SECTION, AN ANGULAR DISTRIBUTION FOR EMERGENT NON-ELASTIC NEUTRONS BETWEEN TWO NEUTRON ENERGIES, ETC. THERE ARE THREE DICTIONARIES USED FOR INPUT TO THE DATA FILE - ONE FOR THE REACTION-TYPE DESIGNATOR, ONE FOR THE STATUS OF THE DATA, AND ONE TO FLAG THE PROGRAM TO PERFORM CERTAIN CONVERSIONS. EXPERIMENTAL NEUTRON DATA ARE, IN GENERAL, COMPOSED OF TWO INTERDEPENDENT, BUT LOGICALLY SEPARABLE PARTS, THE BIBLIOGRAPHIC INFORMATION AND THE ACTUAL EXPERIMENTAL VALUES. THE REFERENCE ACCESSION NUMBER, WHICH IS ASSIGNED TO A REFERENCE AND ITS ASSOCIATED SET OF DATA AS THEY ARE ACQUIRED, SERVES AS A LINK BETWEEN THE BIBLIOGRAPHIC AND THE EXPERIMENTAL DATA FILES. AFTER A REFERENCE ACCESSION NUMBER IS ASSIGNED TO A NEW REFERENCE, THE FOLLOWING INFORMATION IS ENTERED INTO THE BIBLIOGRAPHIC FILE - THE COMPLETE BIBLIOGRAPHIC CITATION, THE LABORATORY WHERE THE MEASUREMENT WAS PERFORMED, A BRIEF DESCRIPTION OF THE EXPERIMENTAL TECHNIQUE, CORRECTIONS THAT HAVE BEEN MADE TO THE RESULTS, AND NORMALIZATIONS, IF ANY. IN ADDITION, ANY CHANGES MADE TO THE DATA (RENORMALIZATIONS TO BETTER STANDARDS, CORRECTIONS, ETC.) ARE RECORDED HERE. SUPPLEMENTARY REFERENCES ARE CARRIED ALONG AS SEE ALSOS.

375 SCORE3 SCORE IS AN INTERACTIVE NEUTRON CROSS SECTION EVALUATION SYSTEM.

384 CHECKER/CRECT/CAMMET/PLOTFB/ THIS PACKAGE OF FIVE PROGRAMS IS DESIGNED FOR PROCESSING ENDF/B (EVALUATED NUCLEAR DATA FILE VERSION B) VERSION I TAPES.

CHECKER CHECKS THAT THE ENDF/B TAPES ARE IN PROPER FORMAT AND ALL FIELDS ARE WITHIN SPECIFIED LIMITS, RATHER THAN THE PHYSICS OF THE DATA LIBRARY. ANGULAR DISTRIBUTIONS RECONSTRUCTED FROM LEGENDRE COEFFICIENTS ARE EVERYWHERE POSITIVE.

CRECT, WHICH CAN PROCESS ENDF/B VERSION III DATA AS WELL AS EARLIER VERSIONS, PROVIDES A MEANS OF CORRECTING ASSEMBLED DATA ON A TAPE BY INSERTION AND DELETION OF DATA.

DAMMET SELECTIVELY MERGES DATA FROM ONE OR TWO ENDF/B LIBRARY TAPES ONTO A FINAL TAPE. THE MODE (BCD OR BINARY) AND ARRANGEMENT (STANDARD OR ALTERNATE) MAY BE CHANGED DURING THIS PROCESS.

PLOTFB PROCESSES ENDF/B LIBRARY TAPES WHICH CONTAIN DATA EMBEDDED WITHIN A NECESSARY LIBRARY STRUCTURE IN ORDER TO PRODUCE COMPREHENSIVE LISTINGS AND/OR PLOTS. THE LISTINGS AND/OR PLOTS CONTAIN AN EXTENSIVE AMOUNT OF INFORMATION RELATED TO THE DATA, SUCH AS TEMPERATURE DEPENDENCE, PHYSICAL UNITS OF THE DATA, INTERPOLATION LAWS FOR THE DATA, CRYPTIC TITLES DEFINING THE REACTION TYPE, ETC.

SLAVE3 PROVIDES MODULAR SUBROUTINES WHICH CAN BE ASSEMBLED TO RETRIEVE AND PROCESS ENDF/B DATA FOR A SPECIFIC PROBLEM.

386 DATATRAN DATATRAN SUPPLIES A LINKAGE SYSTEM FOR MODULARIZED PROGRAMS, ENABLES A HIERARCHICAL NAMING TECHNIQUE, AND SIMPLIFIES HANDLING OF STRUCTURED DATA LISTS.

403 TIGIR2 TIGIR IS A MODULAR PROGRAM DESIGNED TO GENERATE AND MAINTAIN LIBRARIES OF DOCUMENT INFORMATION (ABSTRACTS, BIBLIOGRAPHIC INFORMATION, INDEX TERMS, AND OTHER SIGNIFICANT INFORMATION), TO RETRIEVE THE INFORMATION SELECTIVELY, TO PRINT THE RETRIEVED INFORMATION IN VARIOUS OUTPUT FORMATS, AND TO GENERATE STATISTICS OF THE INFORMATION FILES.

472 MERMC2/MAGIC THE PROGRAMS MERMC2 AND MAGIC ARE SERVICE ROUTINES FOR USE WITH THE BINARY CROSS-SECTION LIBRARY TAPES OF THE MC**2 MULTIGROUP CROSS-SECTION PROGRAM.

MERMC2 TAKES AS INPUT TWO MC**2 LIBRARY TAPES AND PRODUCES A NEW MC**2 LIBRARY TAPE CONTAINING DATA FROM BOTH INPUT TAPES WITH DELETION OF PARTICULAR MATERIALS AS DESIRED, OR MERMC2 MAY BE USED TO CREATE A NEW LIBRARY TAPE FROM A SINGLE INPUT TAPE BY SIMPLY DELETING SELECTED MATERIALS.

MAGIC PRODUCES LIBRARY TAPE LISTINGS AND TAPES FOR OFF-LINE CALCOMP PLOTTING OF SELECTED DATA FROM AN MC**2 LIBRARY TAPE.

475 CRECT/CHECKER/RIGEL/PLOTFB/ THIS PACKAGE OF EIGHT PROGRAMS IS DESIGNED FOR PROCESSING ENDF/B II (EVALUATED NUCLEAR DATA FILE VERSION B FORMAT II) TAPES.

CRECT, WHICH PROCESSES VERSION III ENDF/B DATA AS WELL AS EARLIER VERSIONS, PROVIDES A MEANS OF CORRECTING ASSEMBLED DATA ON A TAPE BY INSERTION AND DELETION OF DATA.

CHECKER CHECKS THAT THE ENDF/B BCD CARD IMAGE FORMAT TAPES ARE IN PROPER FORMAT AND ALL FIELDS ARE WITHIN SPECIFIED LIMITS, RATHER THAN THE PHYSICS OF THE DATA LIBRARY. ANGULAR DISTRIBUTIONS RECONSTRUCTED FROM LEGENDRE COEFFICIENTS ARE CHECKED TO ENSURE THEY ARE EVERYWHERE POSITIVE.

RIGEL WILL PERFORM ANY OR ALL OF THE FOLLOWING OPERATIONS - SELECTIVELY RETRIEVE ENDF/B DATA ON FROM 1 TO 9 ENDF/B TAPES, MERGE RETRIEVED ENDF/B DATA ONTO FROM 1 TO 8 ENDF/B RESULT TAPES, CHANGE TAPE ARRANGEMENT (FROM STANDARD TO ALTERNATE OR VICE VERSA) AND CHANGE TAPE MODE.

LISTFC, WHICH PROCESSES VERSION III ENDF/B DATA AS WELL AS EARLIER VERSIONS, PRODUCES INTERPRETED LISTINGS OF INFORMATION FROM BCD STANDARD ARRANGEMENT ENDF/B TAPES.

DICTION CONSTRUCTS A NEW SECTION DICTIONARY (FILE 1, SECTION 451) FOR AN ENTIRE ENDF/B TAPE. IF A SECTION DICTIONARY IS ALREADY PRESENT IT IS REPLACED.

PLOTFB PROCESSES ENDF/B LIBRARY TAPES WHICH CONTAIN DATA EMBEDDED WITHIN A NECESSARY LIBRARY STRUCTURE IN ORDER TO PRODUCE COMPREHENSIVE LISTINGS AND/OR PLOTS. THE LISTINGS AND/OR PLOTS CONTAIN AN EXTENSIVE AMOUNT OF INFORMATION RELATED TO THE DATA, SUCH AS TEMPERATURE DEPENDENCE, PHYSICAL UNITS OF THE DATA, INTERPOLATION LAWS FOR THE DATA, CRYPTIC TITLES DEFINING THE REACTION TYPE, ETC.

SLAVE3 PROVIDES MODULAR SUBROUTINES WHICH CAN BE ASSEMBLED TO RETRIEVE AND PROCESS ENDF/B DATA FOR A SPECIFIC PROBLEM.

DAMMFT SELECTIVELY MERGES DATA FROM ONE OR TWO ENDF/B LIBRARY TAPES ONTO A FINAL TAPE. THE MODE (BCD OR BINARY) AND ARRANGEMENT (STANDARD OR ALTERNATE) MAY BE CHANGED DURING THIS PROCESS.

490 JOSHUA OPERATING SYSTEM JOSHUA IS A SCIENTIFIC MODULAR DATA BASED SYSTEM FOR BATCH AND TERMINAL OPERATION. LARGE VOLUMES OF DATA CAN BE STORED AND RETRIEVED FOR COMPUTATION AND DISPLAY.

493 TROUT TROUT IS A FILE MAINTENANCE PROGRAM WHICH ALLOWS THE USER TO ALTER, MERGE, DELETE, OVERLAY OR CREATE MULTIGROUP CROSS SECTION FILES IN MUG FORMAT.

502 EDITOR EDITOR PRODUCES READABLE LISTINGS OF THE CONTENTS OF ENDF/B NUCLEAR DATA CROSS SECTION TAPES. IT ALSO ALLOWS COPYING, ALTERING MODE, MERGING AND PUNCHING OF THE DATA ON ONE OR MORE ENDF/B TAPES.

522 ARC-SYSTEM ARC-SYSTEM IS THE COLLECTION OF SYSTEMS SUBPROGRAMS AND MODULES WHICH PROVIDE THE SOFTWARE ENVIRONMENT NECESSARY TO EXECUTE THE MODULAR COMPUTATIONAL CAPABILITIES OF THE ARGONNE REACTOR COMPUTATION (ARC) SYSTEM ON IBM360 SYSTEMS.

557 SHLOG SHLOG PROVIDES GENERAL-PURPOSE DATA MANIPULATION FUNCTIONS FOR DATA ANALYSIS. THESE FUNCTIONS INCLUDE CREATING, MAINTAINING, AND STORING FILES, DISPLAYING THE CONTENTS OF A FILE VIA EITHER THE LINE PRINTER OR AN ON-LINE PLOTTER, SEARCHING FOR DATA POINTS BY COMPARING VALUES WITH SPECIFIED CRITERIA, AND PERFORMING CERTAIN STATISTICAL OPERATIONS ON THE DATA POINTS.

571 CHECK3/RIGEL3 THESE PROGRAMS ARE USED TO PROCESS ENDF/B VERSION III DATA. IN ADDITION, THE CDC6600 PROGRAMS WILL PROCESS ENDF/B VERSION IV DATA. CHECK3 CHECKS THAT THE ENDF/B TAPES ARE IN PROPER FORMAT AND ALL FIELDS ARE WITHIN SPECIFIED LIMITS, RATHER THAN THE PHYSICS OF THE DATA LIBRARY. ANGULAR DISTRIBUTIONS RECONSTRUCTED FROM LEGENDRE COEFFICIENTS ARE EVERYWHERE POSITIVE. RIGEL3 WILL PERFORM ANY OR ALL OF THE FOLLOWING OPERATIONS - SELECTIVELY RETRIEVE ENDF/B DATA ON FROM 1 TO 9 ENDF/B TAPES, MERGE RETRIEVED ENDF/B DATA ONTO FROM 1 TO 8 ENDF/B RESULT TAPES, CHANGE TAPE ARRANGEMENT (FROM STANDARD TO ALTERNATE OR VICE-VERSA) AND CHANGE TAPE MODE.

587 AEC-ALO FAU THE AEC-ALO RADIO FREQUENCY ASSIGNMENTS AND USES PROGRAM (FAU) PROVIDES FOR MAINTAINING RADIO FREQUENCY ASSIGNMENT AND TRANSACTION RECORDS. IT LISTS ALL RADIO FREQUENCY ASSIGNMENTS AND USES FROM INITIAL APPLICATION (AEC-310) THROUGH AUTHORIZATIONS (IRAC DOCKET). THE PROGRAM ALLOWS FOR SORTING BY OFFICE, SYSTEM NUMBER, LOCATION, FREQUENCY, EXPIRATION DATE, ALO OR AEC SERIAL NUMBER, AND IRAC DOCKET NUMBER.

589 BECOM AEC REGULATIONS REQUIRE THAT A PURCHASE VS. LEASE ANALYSIS BE MADE ON EACH PIECE OF DATA PROCESSING EQUIPMENT AS PART OF THE STUDY PRECEDING THE LEASE OR PURCHASE OF SUCH EQUIPMENT. IN ADDITION, IT IS REQUIRED THAT A PURCHASE VS. LEASE ANALYSIS BE PREPARED ANNUALLY FOR EACH ITEM OF DATA PROCESSING EQUIPMENT LEASED WITH AEC FUNDS. BECOM WAS DEVELOPED TO FACILITATE THE RAPID AND ACCURATE PREPARATION OF AN AEC PURCHASE VS. LEASE SCHEDULE FOR AN ITEM OF DATA PROCESSING EQUIPMENT.

595 MAPPER MAPPER IS A COMPUTER PROGRAM FOR PREDICTING EQUIPMENT REQUIREMENTS. IT WAS DESIGNED AS AN AID TO MANAGEMENT AND CAN INTERPRET COMPONENT PRODUCTION REQUIREMENTS BACKWARD FROM SHIPPING SCHEDULES TO THE PROCESS OF INTEREST, CALCULATE EQUIPMENT CAPACITY, DISPLAY SIX MONTHS PRIOR EQUIPMENT UTILIZATION AND PROCESS YIELD DATA.

603 RALCRTPH RALCRTPH IS A RESOURCE ALLOCATION SYSTEM USED TO PROVIDE THE PROJECT PLANNER WITH A TOOL TO HELP HIM SCHEDULE RESOURCES INVOLVED IN A PROJECT. INFORMATION ON WHICH JOBS ARE CRITICAL AND THE RESOURCES AVAILABLE IS NECESSARY FOR PROJECT SCHEDULING. THIS SYSTEM IS ORIENTED TOWARD THE USER WHO IS PLANNING A PLANT SHUTDOWN. HOWEVER, IT ALSO HAS APPLICATIONS IN OTHER AREAS.

607 SPIRAL THE GENERAL ABILITY OF SPIRAL IS BUILDING, PERHAPS GRADUALLY, A MACHINE-READABLE ENCYCLOPEDIA OF INFORMATION ITEMS THAT ARE OR MAY BECOME IMPORTANT TO A PARTICULAR PROJECT, AND THEN LATER, RECALLING BITS OF INFORMATION AS REQUIRED. THE INFORMATION CONTENT OF A COLLECTION CAN RANGE FROM CRYPTIC COMMENTS (AS OCCUR IN SOME TEST AND INSPECTION RECORDS) TO MORE LENGTHY ENTRIES (SUCH AS TECHNICAL ABSTRACTS AND MANAGEMENT BRIEFS) AS WELL AS FULL TEXT OF DOCUMENTS.

638 RIGEL4,CHECK4,SUMUP4,LISTF4, THESE PROGRAMS ARE UPDATED VERSIONS OF ENDF/B CHECKING, RETRIEVAL, AND DISPLAY CODES CAPABLE OF PROCESSING THE VERSION-IV DATA FILES.

RIGEL4 RETRIEVES ENDF/B DATA AND CHANGES MODE (BCD-BIN) OR ARRANGEMENT. UPDATED VERSION PROCESSES DECAY DATA (MF=1, MT=457) AND ERROR FILES.

CHECK4 CHECKS THE STRUCTURE, CONSISTENCY, AND FORMATS OF ENDF DATA FILES. UPDATED VERSION RECOGNIZES NEWLY DEFINED MT AND MF NUMBERS, CHECKS MT=457 AND THE FORMATS OF THE ERROR FILES, CONTAINS RSIC PHOTON FILE CHANGES.

SUMUP4 CHECKS WHETHER PARTIAL CROSS SECTIONS ADD UP TO THE TOTAL. UPDATED VERSION FLAGS GRID POINTS PRESENT IN THE PARTIAL CROSS SECTION, ABSENT IN THE TOTAL.

LISTF4 PRODUCES INTERPRETED LISTINGS OF ENDF/B DATA. UPDATED VERSION LISTS MT=457, SKIPS OVER ERROR FILES, CONTAINS MINOR CORRECTIONS.

PLOTF4 PRODUCES PLOTS OF ENDF/B DATA. UPDATED VERSION PLOTS MT=457, SKIPS OVER ERROR FILES, CONTAINS MINOR CORRECTIONS.

RESEND PROCESSES ENDF MATERIALS WITH RESONANCE PARAMETERS INTO A POINTWISE FORM. CAPABILITY OF PROCESSING ADLER-ADLER PARAMETERS ADDED.

CRECT CORRECTS ENDF/B DATA FILES.

DICT4 GENERATES A SECTION TABLE OF CONTENTS (DICTIONARY) FOR ENDF/B MATERIALS.

CAREN4 TESTS FOR DISCONTINUITIES ACROSS THE LIMITS OF RESONANCE RANGES OF AN ENDF/B MATERIAL. UPDATED VERSION CONTAINS MINOR CORRECTIONS.

133 WED THIS PROGRAM EDITS THE MAGNETIC TAPE PRODUCED BY W-DSN CALCULATING REACTION RATES BY ENERGY AND BY VOLUME WITH TOTALS. IT CAN ALSO PRODUCE REACTION RATES FOR FED-IN CROSS SECTIONS.

207 CROSSPLOT/CROSSPLOT DATA TAPE AUTOMATIC PLOTS ARE GENERATED FROM NEUTRON CROSS SECTION DATA.

210 DTX THE DTX CODE CALCULATES EFFECTIVE MACROSCOPIC, HOMOGENEOUS, GROUP CROSS SECTIONS WHICH ARE SPACE-AVERAGED OVER THE FLUXES AND CURRENTS PRE-CALCULATED IN A ONE-DIMENSIONAL NEUTRON TRANSPORT CODE SUCH AS DTK OR DSN. ISOTROPIC AND ANISOTROPIC CROSS SECTIONS MAY BE INCLUDED.

239 CPS CPS PROVIDES A GRAPHICAL MEANS OF COMPARING EXPERIMENTAL CROSS SECTION VALUES OBTAINED FROM THE SCISRS LIBRARY TAPE WITH AN OPTION TO INCLUDE READING IN NEW EXPERIMENTAL OR CALCULATED VALUES.

409 LARCA MULTIGROUP CROSS SECTIONS ARE WEIGHTED BY THE FLUX IN THE APPROPRIATE GROUPS AND REGIONS, AND CROSS SECTIONS FOR THE ASSEMBLY ARE COMPUTED AND PUNCHED IN DTF4 FORMAT. THE PROGRAM ALSO COMPUTES THE INFINITE MEDIUM FLUX, REACTION RATES, AND THE INFINITE MULTIPLICATION FACTOR AND MATERIAL BUCKLING.

434 HEATMESH HEATMESH IS USED TO GENERATE GEOMETRICAL DATA REQUIRED FOR STUDIES OF HEAT TRANSFER IN AXISYMMETRIC STRUCTURES REPRESENTED AS SURFACES OF REVOLUTION. THE PROGRAM CONSISTS OF TWO DISTINCT PHASES. THE FIRST SUBDIVIDES THE GIVEN PARTS INTO A NODAL NETWORK AND EVALUATES THE GEOMETRICAL PROPERTIES OF THE NODES. THE SECOND DETERMINES ADJACENT NODES AND EDITS GEOMETRICAL DATA FOR THE THERMAL MODEL.

455 DAC1 DAC1 USES ANGULAR FLUXES FROM THE DTF4 SN CODE TO CALCULATE REACTIVITY PERTURBATIONS, EFFECTIVE DELAYED NEUTRON FRACTIONS, AND GENERATION TIMES IN REACTORS. THE REFERENCE REACTOR SPECIFICATIONS ARE INPUT TO DAC1 BY A DIRECT READING OF THE DTF4 INPUT DECK. CONSEQUENTLY, THE ONLY ADDITIONAL INPUT NEEDED ARE THE PERTURBATION SPECIFICATIONS.

471 GAPER2D GAPER2D IS A TWO-DIMENSIONAL TRANSPORT PERTURBATION THEORY PROGRAM USING THE REAL AND ADJOINT FLUXES AND CURRENTS FROM 2DF (ACC ABSTRACT 173) PROBLEM RESULTS TO COMPUTE REACTIVITY CHANGES DUE TO SMALL PERTURBATIONS IN REFLECTED MULTIREGION SYSTEMS.

544 PLOT-3D PLOT-3D IS A PACKAGE OF SUB-PROGRAMS DESIGNED TO DRAW THREE-DIMENSIONAL SURFACES FROM ARRAYS OF POINTS (X,Y,Z). THE SURFACES CAN BE DRAWN AFTER ARBITRARY ROTATIONS ABOUT THE THREE COORDINATE AXES.

606 GAPER1D REACTIVITY COEFFICIENTS ARE COMPUTED USING FIRST-ORDER TRANSPORT PERTURBATION THEORY FOR ONE-DIMENSIONAL MULTI-REGION REACTOR ASSEMBLIES. THE NUMBER OF SPATIAL MESH POINTS AND ENERGY GROUPS IS ARBITRARY. AN ELEMENTARY SYNTHESIS SCHEME IS EMPLOYED FOR TREATMENT OF TWO- AND THREE-DIMENSIONAL PROBLEMS. THE CONTRIBUTIONS TO THE CHANGE IN INVERSE MULTIPLICATION FACTOR, DELTA(1/K), FROM PERTURBATIONS IN THE INDIVIDUAL CAPTURE, NET FISSION, TOTAL SCATTERING, (N,2N), INELASTIC SCATTERING, AND LEAKAGE CROSS SECTIONS ARE COMPUTED. A MULTI-DIMENSIONAL PROMPT NEUTRON LIFETIME CALCULATION IS ALSO AVAILABLE.

154 CROC90 THE CROC90 CODE WAS DEVELOPED FOR USE IN THE DATA REDUCTION OF OUT-OF-PILE FLUID FLOW EXPERIMENTS ON THE ML-1 FUEL ELEMENTS. THE CODE IS SPECIFICALLY DESIGNED TO EVALUATE FRICTION FACTORS, ENTRANCE AND EXIT COEFFICIENTS, AND ORIFICE CALIBRATIONS FROM HYDRODYNAMIC DATA OBTAINED FROM SINGLE PHASE EXPERIMENTAL FLUID FLOW TESTS IN AXIAL FLOW DUCTS.

164 BURP1 THE PROGRAM CALCULATES ABSOLUTE TOTAL EFFICIENCY FOR MONOENERGETIC GAMMA RAY INTERACTIONS IN CYLINDRICAL SCINTILLATION DETECTORS. THE ABSOLUTE TOTAL EFFICIENCY IS DEFINED AS THE FRACTION OF SOURCE GAMMAS WHICH INTERACT AT LEAST ONCE WITH THE CRYSTAL DETECTOR. CALCULATIONS ARE MADE FOR THE POINT ISOTROPIC SOURCE LOCATED ALONG THE AXIS OF SYMMETRY FOR SOLID CYLINDRICAL CRYSTALS, WITH OR WITHOUT A COAXIAL CYLINDRICAL WELL.

165 BURP2 THE PROGRAM CALCULATES THE ABSOLUTE TOTAL EFFICIENCY FOR MONOENERGETIC GAMMA RAYS INTERACTING IN CYLINDRICAL SCINTILLATION DETECTORS. THE ABSOLUTE TOTAL EFFICIENCY IS DEFINED AS THE FRACTION OF SOURCE GAMMAS WHICH INTERACT AT LEAST ONCE WITH THE CRYSTAL DETECTOR. CALCULATIONS ARE MADE FOR HOMOGENEOUS, ISOTROPIC CIRCULAR DISK OR CYLINDRICAL VOLUME SOURCES. SOURCES MUST BE SYMMETRICAL WITH THE AXIS OF SYMMETRY FOR SOLID CYLINDRICAL CRYSTALS, WITH OR WITHOUT A COAXIAL CYLINDRICAL WELL. SOURCE ABSORPTION AND SCATTERING MAY BE INCLUDED FOR VOLUME SOURCES.

166 BURP3 THE PROGRAM CALCULATES ABSOLUTE TOTAL EFFICIENCY FOR MONOENERGETIC GAMMA RAY INTERACTIONS IN CYLINDRICAL SCINTILLATION DETECTORS. THE ABSOLUTE TOTAL EFFICIENCY IS DEFINED AS THE FRACTION OF SOURCE GAMMAS WHICH INTERACT AT LEAST ONCE WITH THE CRYSTAL DETECTOR. CALCULATIONS ARE MADE FOR POINT ISOTROPIC SOURCES LOCATED BOTH ON AND OFF THE AXIS OF SYMMETRY FOR SOLID CYLINDRICAL CRYSTALS, WITH OR WITHOUT A COAXIAL CYLINDRICAL WELL. THE EFFICIENCIES FOR POINTS LOCATED AT SPECIFIED RADIAL OFF-AXIS POSITIONS, FOR A SINGLE AXIAL SOURCE-CRYSTAL DISTANCE, ARE NORMALIZED TO THE ON-AXIS EFFICIENCY FOR THE SAME AXIAL DISTANCE. THE ABSOLUTE EFFICIENCY FOR THE ON-AXIS POINT IS GIVEN.

169 BURP4 BURP4 CALCULATES THE PHOTO-FRACTION FOR MONOENERGETIC GAMMA RAYS INTERACTING IN SOLID CYLINDRICAL SCINTILLATION DETECTORS. PHOTOFRACTION IS DEFINED AS THE FRACTION OF INTERACTING SOURCE GAMMAS THAT ARE TOTALLY ABSORBED (INCLUDING SECONDARIES) IN THE CRYSTAL. ISOTROPIC SOURCE GEOMETRIES ALLOWED ARE ISOTROPIC POINTS (ON OR OFF-AXIS), DISKS, CYLINDRICAL VOLUMES. ALLOWED MONODIRECTIONAL SOURCES, NORMAL TO CRYSTAL FACE, ARE NARROW BEAM COLLIMATED TO CRYSTAL AXIS, BROAD BEAM ILLUMINATING ENTIRE CRYSTAL FACE, AND COLLIMATED BEAM OF ANY SPECIFIED DIAMETER.

170 BURP5 BURP5 CALCULATES THE PHOTO-FRACTION FOR MONOENERGETIC GAMMA RAYS INTERACTING IN WELL-TYPE CYLINDRICAL SCINTILLATION DETECTORS. PHOTOFRACTION IS DEFINED AS THE FRACTION OF INTERACTING SOURCE GAMMAS THAT ARE TOTALLY ABSORBED (INCLUDING SECONDARIES) IN THE CRYSTAL. ISOTROPIC SOURCE GEOMETRIES ALLOWED ARE ISOTROPIC POINTS (ON OR OFF-AXIS), DISKS, CYLINDRICAL VOLUMES. ALSO ALLOWS NARROW MONODIRECTIONAL BEAM COLLIMATED TO CRYSTAL AXIS, INCIDENT NORMAL TO WELL BOTTOM.

248 COINC (COMPUTER CODE FOR REDUC COINCIDENCE COUNTING DATA ARE TREATED TO OBTAIN SPECIFIC DISINTEGRATION RATES, CHANNEL EFFICIENCIES AND COUNT RATES, WEIGHTED MEANS, AND ALL ASSOCIATED STANDARD ERRORS. CORRECTIONS ARE MADE FOR UNEQUAL DEADTIME LOSS IN EACH CHANNEL, COINCIDENCE RESOLVING TIME LOSSES, DECAY DURING COUNTING, DECAY FROM A REFERENCE TIME, AND BACKGROUND IN EACH OF THE THREE CHANNELS. INPUT VARIABLES INCLUDE SAMPLE IDENTIFICATION, START TIME FOR COUNTING, SAMPLE REFERENCE TIME, COUNTING INTERVAL, TOTAL NUMBER OF COUNTS IN TWO SINGLE CHANNELS AND ONE COINCIDENCE CHANNEL, AND NORMALIZING SAMPLE VOLUME. INPUT PARAMETERS CONSIST OF DEADTIMES OF EACH SINGLE CHANNEL, COINCIDENCE RESOLVING TIME FOR ALL THREE CHANNELS, DECAY CONSTANT, BACKGROUND COUNT RATE FOR ALL THREE CHANNELS, AND STANDARD ERRORS FOR EACH OF THE ABOVE PARAMETERS. OPTIONAL INPUT ALLOWS DATE, GROUP CLASSIFICATION, AND A 3-DIGIT USER CODE. OUTPUT CONTAINS CORRECTED SINGLE CHANNEL, COINCIDENCE, AND DISINTEGRATION RATES REFERRED TO START OF COUNT, SPECIFIC DISINTEGRATION RATE (COUNTS/SECOND/UNIT VOLUME OR WEIGHT) REFERRED TO REFERENCE TIME, WEIGHTED MEAN AND ERROR OF ANY NUMBER OF PROBLEMS IN A GROUP, EFFICIENCIES OF THE TWO INDEPENDENT DETECTOR CHANNELS, DATE, SUMMARY OF BACKGROUND VALUES USED, IDENTIFICATION NUMBER, COUNT START TIME, AND UPPER AND LOWER LIMIT (ONE STANDARD DEVIATION) OF EACH OF THE COMPUTED QUANTITIES.

258 EXPN EXPN ANALYZES PULSED NEUTRON DATA USING THE GARELIS-RUSSEL TECHNIQUE (REFERENCE 1). BASICALLY THE CODE COMPUTES THE PROMPT DECAY CONSTANT, ALPHA, AND THE PARAMETER (K*BETA/L) FROM EXPERIMENTAL DATA, WHICH IS DIRECTLY EXTRACTED FROM A TIME ANALYZER STORAGE MEMORY AND READ ONTO A PUNCHED PAPER TAPE. THE ALPHA-DETERMINATION PART OF THE CODE WAS ORIGINALLY OBTAINED UNDER THE NAME EXPLICIT FROM KNOLLS ATOMIC POWER LABORATORY BUT HAS SINCE BEEN MODIFIED. THE CODE PROVIDES OPTIONS FOR A PRE-BURST OR A POST-BURST BACKGROUND ANALYSIS. THAT IS, THE PARAMETERS ALPHA AND (K*BETA/L) ARE OBTAINED USING A BACKGROUND MEASURED PRIOR TO THE BURST OR MEASURED AFTER THE BURST.

311 BURNUP BURNUP CORRELATES HEAVY ELEMENT ISOTOPIC ANALYSIS WITH FISSION PRODUCT NEODYMIUM, URANIUM, AND PLUTONIUM CONCENTRATIONS IN AN IRRADIATED URANIUM FUEL FOR CALCULATION OF BURNUP (ATOM PER CENT FISSION AND MWD/MT). REACTOR PARAMETERS, INCLUDING EFFECTIVE NEUTRON ABSORPTION CROSS SECTIONS FOR ALL URANIUM AND PLUTONIUM ISOTOPES, CAPTURE-TO-FISSION RATIOS FOR U235, PU239, AND PU241, A TWO-GROUP DESCRIPTION OF THE NEUTRON SPECTRUM, THE AVERAGE NEUTRON TEMPERATURE, THE REACTOR FAST FISSION FACTOR, AND THE DISTRIBUTION OF THE SOURCES OF FISSION AMONG THE FISSIONABLE NUCLIDES ARE COMPUTED FROM THE EXPERIMENTAL DATA OBTAINED FROM THE MASS SPECTROMETRIC ANALYSIS OF URANIUM, PLUTONIUM, AND NEODYMIUM.

333 TOAD TOAD IS USED TO PROCESS AND ANALYZE GAMMA RAY SPECTRA.

390 CORGAM A CORRELATION ALGORITHM IS CODED TO ALLOW THE UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA TYPICALLY COLLECTED IN A NEUTRON ACTIVATION ANALYSIS PROCEDURE. CORGAM (1) WILL COMPENSATE FOR ELECTRONIC SHIFTS IN THE DATA, (2) WILL CORRECT FOR BACKGROUND, (3) WILL NORMALIZE THE DATA TO A FIXED NEUTRON FLUX LEVEL, (4) ALLOWS A CHOICE OF WEIGHTING FACTORS, AND (5) ALLOWS A CHOICE OF METHODS FOR CALCULATION OF STANDARD DEVIATIONS. THE CODE REQUIRES A MATRIX OF REFERENCE GAMMA-RAY SPECTRA. THESE SPECTRA CAN BE IN A RAW-DATA FORM. ALL OF THE MODIFICATIONS AVAILABLE TO THE COMPLEX GAMMA-RAY SPECTRA ARE AVAILABLE TO THE REFERENCE GAMMA-RAY SPECTRA. IN ADDITION, A DECAY CORRECTION IS AVAILABLE FOR THE REFERENCE GAMMA-RAY SPECTRA. ONLY THE REFERENCE GAMMA-RAY SPECTRA THAT HAVE INTENSITY COEFFICIENTS WHICH ARE SIGNIFICANT AT A PRESCRIBED LEVEL OF SIGNIFICANCE ARE RETAINED IN THE FINAL SOLUTION. THE INTERMEDIATE SOLUTIONS, I.E., THOSE SOLUTIONS THAT CONTAIN REFERENCE GAMMA-RAY SPECTRA WHICH HAVE NONSIGNIFICANT INTENSITY COEFFICIENTS AT THE PRESCRIBED LEVEL, ARE PRINTED OUT. THEREFORE, SEVERAL SOLUTIONS ARE IMBEDDED IN THE FINAL SOLUTION.

394 JITER JITER COMPUTES THE FOLLOWING QUANTITIES MEASURED IN REACTOR FLUCTUATION EXPERIMENTS - THE DISPERSION PARAMETER Y, THE MODIFIED COEFFICIENT OF CORRELATION MCC, THE FREQUENCY DEPENDENT PART OF THE POWER SPECTRAL DENSITY PSD, AND THE CROSS POWER SPECTRAL DENSITY CPSD.

413 ALPHA-M ALPHA-M IS USED FOR DETERMINING RADIOISOTOPES BY LEAST SQUARES RESOLUTION OF THE GAMMA RAY SPECTRA. IT CAN HANDLE A VERY LARGE LIBRARY OF GAMMA RAY SPECTRA AND TAKES INTO ACCOUNT CORRECTIONS SUCH AS BACKGROUND SUBTRACTION, COUNTING TIME, DECAY TIME, DEAD TIME, AUTOMATIC COMPENSATION FOR GAIN AND THRESHOLD SHIFTS, SIZE OF THE ALIQUOT, VOLUME REDUCTION PRIOR TO COUNTING, AND SO ON.

421 MICHRD THE VICKERS PYRAMID NUMBER AND THE MICROHARDNESS INCREMENT FRACTION ARE COMPUTED FROM FILAR MICROMETER EYEPIECE READINGS. THESE READINGS ARE MADE ON INDENTS, WHICH HAVE BEEN MADE BY AN INDENTER, IN THE MATERIAL BEING TESTED.

425 REDUX REDUX IS USED FOR THE REDUCTION OF DATA FROM REACTOR FLUCTUATION EXPERIMENTS. FROM INPUT COUNT SAMPLES RECORDED BY ONE OR TWO COUNTING CHANNELS, THE PROGRAM COMPUTES UNBIASED SAMPLE ESTIMATES OF MOMENTS AND FUNCTIONS OF MOMENTS OF THE COUNT DISTRIBUTIONS, INCLUDING THE DISPERSION PARAMETER Y AND THE MODIFIED COEFFICIENT OF CORRELATION MCC. STANDARD ERROR ESTIMATES ARE COMPUTED FOR Y AND MCC.

457 GSSLRN1B GSSLRN1B IS UTILIZED FOR EVALUATIONS AND STATISTICAL DETERMINATION OF PHOTOPEAKS IN PHOTON SPECTRA. THE CODE PERFORMS EVALUATIONS OF PHOTOPEAK SPECTRA USING AS INPUT THE DIGITIZED PULSE HEIGHT DISTRIBUTION WHICH IS OUTPUT FROM A LARGE MULTICHANNEL ANALYZER. PHOTOPEAKS ARE LOCATED, FUNCTIONS FIT TO EACH REAL PEAK, AND THE RELATIVE INTENSITY OF EACH FITTED PEAK ABOVE THE BACKGROUND CONTINUUM IS CALCULATED. THE CODE IS EASILY ADAPTABLE FOR ANALYSIS OF ANY SPECTRA WHICH CAN BE ADEQUATELY DEFINED BY PEAKS REPRESENTED IN ANALYTIC FORM.

464 DYNO1 DYNO1 CALCULATES THE DISTRIBUTION OF ELECTRONS THAT ARE EMITTED FROM A PHOTOMULTIPLIER COMPOSED OF A SERIES OF DYNODES.

469 PMS1 PMS1 CORRECTS EXPERIMENTAL FAST NEUTRON POLARIZATION DATA FOR FINITE GEOMETRY AND MULTIPLE SCATTERING EFFECTS, WHEN LIQUID HELIUM IS THE POLARIZER ANALYZER.

476 CAGE/BIRD/SPEC CAGE/BIRD/SPEC IS A PACKAGE OF THREE INDEPENDENT CODES DESIGNED FOR THE REDUCTION AND PROCESSING OF NEUTRON TIME-OF-FLIGHT SPECTRA IN PULSED MULTIPLYING OR NON-MULTIPLYING ASSEMBLIES.

485 GASPAN GASPAN ANALYZES OUTPUT PULSES FROM A LITHIUM-DRIFTED GERMANIUM SEMICONDUCTOR DETECTOR TO DEFINE COMPLEX GAMMA-RAY SPECTRA OF ROUTINE CRUD AND FILTRATE SAMPLES.

43 CURFIT CURFIT IS A COMPOSITE PROGRAM FOR FITTING EXPERIMENTAL DATA POINTS WITH DIFFERENT TYPES OF COMMON ANALYTIC CURVES. THERE ARE AT PRESENT FIVE FITS AVAILABLE -

(1) POLYNOMIAL Y = SUMMATION OVER I OF A(I)*(X**(I))
(2) EXPONENTIAL Y = A*EXP(BX)
(3) COSINE Y = A*COS(B(X+C))
(4) SERIES OF CUBICS Y = A(J)+B(J)*X+C(J)*(X**2)+D(J)*(X**3)
(5) FOURIER SERIES

62 LOS ALAMOS LEAST SQUARES THIS PROGRAM PERFORMS LEAST SQUARES FITTING OF LINEAR OR NONLINEAR FUNCTIONS IN SEVERAL INDEPENDENT VARIABLES. THE PROGRAM WILL DETERMINE AN ESTIMATE OF A IN THE FUNCTION Y=F(X,A) BY MINIMIZING THE SUM OF SQUARES.
IN THE FUNCTION, X IS A VECTOR OF OBSERVED VARIABLES AND A IS A VECTOR OF PARAMETERS TO BE DETERMINED. IN THIS CONTEXT, A LINEAR FUNCTION IS ONE WHOSE PARTIAL DERIVATIVES WITH RESPECT TO THE ELEMENTS OF A ARE ALL INDEPENDENT OF A. A NONLINEAR FUNCTION HAS AT LEAST ONE OF THE ELEMENTS OF A APPEARING IN AT LEAST ONE OF THESE PARTIAL DERIVATIVES.

186 LAG1/LAG2 LAG IS A SINGLE PASS LOAD AND GO ASSEMBLER DESIGNED TO ACCEPT IBM7090 FLOCC II INSTRUCTIONS.

321 EXPALS THIS PROGRAM FITS BY LEAST SQUARES A FUNCTION WHICH IS A LINEAR COMBINATION OF REAL EXPONENTIAL DECAY FUNCTIONS. THE FUNCTION IS

Y(K) = SUMMATION OVER J OF A(J) * EXP(-LAMBDA(J) * K).

VALUES OF THE INDEPENDENT VARIABLE (K) AND THE DEPENDENT VARIABLE Y(K) ARE SPECIFIED AS INPUT DATA. WEIGHTS MAY BE SPECIFIED AS INPUT INFORMATION OR SET BY THE PROGRAM (W(K) = 1/Y(K)).

324 FRANTIC FRANTIC IS DESIGNED TO PROCESS RAW COUNTING DATA AND TO FIT IN THE LEAST SQUARES SENSE THESE DATA TO THE MULTIPLE EXPONENTIAL GROWTH AND DECAY EQUATIONS. THE PROGRAM CAN BE USED FOR SUMS OF EXPONENTIALS WITH POSITIVE, NEGATIVE, OR ZERO EXPONENTS AND POSITIVE OR NEGATIVE COEFFICIENTS.

327 DAFT1 DAFT1 IS A PROGRAM FOR WEIGHTED LEAST SQUARES FITTING OF 0.0253 EV NEUTRON DATA FOR FISSILE NUCLIDES. THE PROGRAM ALSO CARRIES OUT COMPUTATIONS RELEVANT TO DISCERNING OVERALL GOODNESS OF FIT, PARTICULARLY DEVIANT DATA, AND DATA WHOSE IMPROVEMENT WOULD LEAD TO LARGE REDUCTIONS IN ERROR OF EACH FITTED PARAMETER.

364 SNEQ SNEQ CONSISTS OF THE TWO CODES, SNAP AND EQPLT, WHICH HAVE BEEN MERGED DUE TO THEIR COMMON USE OF THE SLIP COMPILER. SNAP INTERPRETS AND SOLVES PSEUDO-FORTRAN INPUT EQUATIONS REPRESENTING NONLINEAR ALGEBRAIC SYSTEMS. EQPLT INTERPRETS PSEUDO-FORTRAN INPUT EQUATIONS AND CALCULATES AND PLOTS MULTIPLE CURVES ON A SINGLE GRAPH. EQPLT IS USEFUL FOR PARAMETER STUDIES.

407 DATATRAN UTILITY MODULES PLOT2 WAS DESIGNED TO PROVIDE ROUTINE X-Y PLOTS USING THE CALCOMP PLOTTER, MICROFILM UNIT, OR PRINTER AS THE OUTPUT DEVICE. PLOT3 WAS DESIGNED TO PREPARE CONTOUR, PERSPECTIVE, AND STEREOGRAPHIC PLOTS FOR THE CALCOMP PLOTTER OR MICROFILM UNIT OF FUNCTIONS OF TWO VARIABLES.

411 M0661, M0657, M0626 M0661, M0657, AND M0626 PERFORM STATISTICAL ANALYSES OF DATA BASED ON A LEAST SQUARES POLYNOMIAL FIT.

428 DOGGY DOGGY CAN PERFORM MOST ROUTINE FORM SHEET CALCULATIONS. THE PROGRAM CAN HANDLE COMMON ARITHMETIC MANIPULATIONS ON COLUMNS OF INPUT SUCH AS ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION. IT ALSO HAS PROVISIONS FOR THE USE OF SPECIAL FUNCTIONS SUCH AS LOGARITHMIC, TRIGONOMETRIC, ARC TRIGONOMETRIC, HYPERBOLIC, EXPONENTIAL, SQUARE ROOT, MAXIMA, MINIMA, AND RAISING A NUMBER TO ANY POWER. DOGGY ALSO CALCULATES WATER PROPERTIES SUCH AS THERMAL CONDUCTIVITY, VISCOSITY, AND PRANDTL NUMBER OVER A WIDE RANGE OF TEMPERATURE AND PRESSURE.

442 SIMPLE1 SIMPLE1 COMPILES AND EXECUTES MULTISTATEMENT CALCULATIONS TYPED IN A FAMILIAR ALGEBRAIC NOTATION AT A TIME-SHARED TERMINAL, IMMEDIATELY RETURNING REQUESTED RESULTS TO THE TERMINAL AND PERMITTING AD LIB CONTINUATION OF A CALCULATION. THE USER MAY USE THE SYSTEM AS AN EXTENDED AND POWERFUL ELECTRONIC CALCULATOR OR AS A CALCULATOR OF SMALL LOAD-AND-GO RUNS. ERRORS ARE DETECTED AND CORRECTED ON AN AS-YOU-GO BASIS. CALCULATIONS MAY INCLUDE INTERACTIVE INPUT/OUTPUT, FUNCTIONS, AND LOOPS.

444 ROPE ROPE IS USED TO CALCULATE ROOTS OF POLYNOMIALS.

445 LIZARD4 LIZARD4 IS USED TO SOLVE NON-LINEAR, ORDINARY DIFFERENTIAL EQUATIONS AS A ONE-SHOT EFFORT. IT WAS WRITTEN TO SOLVE INITIAL VALUE EQUATIONS, THAT IS, THE VALUES OF THE DEPENDENT VARIABLES MUST BE SPECIFIED AT SOME INITIAL VALUE OF THE INDEPENDENT VARIABLE. ONE-DIMENSIONAL STEADY-STATE BOUNDARY VALUE PROBLEMS CAN BE SOLVED WITH LIZARD4, PROVIDING AN ITERATIVE METHOD IS EMPLOYED BY THE USER WHERE ONE OF THE BOUNDARY CONDITIONS IS SPECIFIED AND INTEGRATION PROCEEDS UNTIL THE ALTERNATE BOUNDARY CONDITION IS MET.

446 MOST MOST IS DESIGNED TO VARY A SET OF COORDINATES (X1,X2, . . . ,XN) REPRESENTING THE VECTOR X IN SUCH A WAY THAT A SPECIFIED FUNCTION Y(X), Y(X) GREATER THAN OR EQUAL TO 0, IS MINIMIZED.

478 BETTIS ENVIRONMENTAL ROUTINES: THE BETTIS ENVIRONMENTAL ROUTINES EXTEND THE FORTRAN LANGUAGE BY MODIFYING SOME OF THE STANDARD CDC6600 LIBRARY ROUTINES AND BY ADDING ROUTINES TO THE LIBRARY TO FACILITATE DECIMAL INPUT AND OUTPUT, FILE MAINTENANCE, SCRATCH I/O, STORAGE ALLOCATION, UTILITY FUNCTIONS, OPERATING SYSTEM INTERFACING, AND OPERATOR COMMUNICATION.

MODEL (MODIFIED ENVIRONMENTAL LIBRARY) DIFFERS FROM THE ORIGINAL BETTIS VERSION IN THAT IT ALLOWS THE OPERATING SYSTEM, RATHER THAN THE ENVIRONMENTAL PACKAGE, TO CONTROL THE OPERATING ENVIRONMENT.

484 FIGS FIGS IS A FORTRAN CALLABLE SUBROUTINE PACKAGE FOR THE SUPPORT OF INTERACTIVE COMPUTING PROGRAMS UTILIZING AN IBM SYSTEM/360 COMPUTER AND AN IBM2250 DISPLAY UNIT.

496 KAPLPLOT KAPLPLOT IS THE SET OF STANDARD CALCOMP SUBROUTINES WRITTEN AT KNOLLS ATOMIC POWER LABORATORY TO PROVIDE GRAPHIC OUTPUT.

GRLIN IS USED TO DRAW AN AXIS SYSTEM, ESTABLISH SCALING FACTORS, AND ENABLE THE USER TO DRAW LINEAR GRAPHS.

GRLOG IS USED TO DRAW AN AXIS SYSTEM, ESTABLISH SCALING FACTORS, AND PERMIT USERS TO DRAW FULL LOGARITHMIC GRAPHS.

LINLG PROVIDES THE CAPABILITY OF DRAWING SEMI-LOGARITHMIC GRAPHS WITH LINEARLY SCALED ABSCISSAS WHILE LOGLN PROVIDES THE SAME CAPABILITY WITH LINEARLY SCALED ORDINATES.

PENSET INITIALIZES THE PLOTTING SUBROUTINES AND DRAWS THE JOB IDENTIFICATION, TIME, DATE, AND CHARGE NUMBER.

PENEND MOVES THE PEN OFF A COMPLETED PLOT AND PREVENTS SUBSEQUENT PLOTS FROM OVERWRITING THE COMPLETED PLOTS.

IPLOT MOVES THE PLOTTER PEN FROM ITS CURRENT POSITION TO A NEW POSITION.

IDPLOT MOVES THE PEN A SPECIFIED INCREMENTAL DISTANCE IN INCHES FROM ITS PRESENT POSITION.

PSCALE ESTABLISHES THE VALUE OF FACTORS TO BE USED BY THE SPLOT SUBROUTINE IN SCALING USER DATA TO FIT ON PLOTTER COORDINATES.

SPLOT CAUSES THE PEN TO MOVE TO COORDINATES WHICH ARE OBTAINED BY APPLYING PSCALE SCALE FACTORS TO USER DATA.

XCPLOT AND YCPLOT CAUSE ALPHABETIC INFORMATION TO BE WRITTEN PARALLEL TO THE DIRECTION OF THE ABSCISSA AXIS, XCPLOT, OR THE ORDINATE AXIS, YCPLOT.

PMARK CAUSES A DISTINCTIVE SYMBOL TO BE PLOTTED AT THE CURRENT POSITION OF THE PEN.

PLTSIZE CONVEYS TO THE PLOTTING SYSTEM INFORMATION WHICH WILL ENABLE THE PLOTTING SYSTEM TO PLACE THE MAXIMUM NUMBER OF PLOTS IN A MINIMUM LENGTH OF PAPER.

497 RELO1 RELO1 COMPUTES THE FAILURE PROBABILITY FOR A SINGLE FAILURE MODE. TWO OPTIONS ARE AVAILABLE - OPTION 1 CALCULATES THE INTERACTION OF TWO NORMALLY DISTRIBUTED VARIATES AND OPTION 2 CALCULATES THE INTERACTION OF TWO TRUNCATED NORMALLY DISTRIBUTED VARIATES.

514 FORSIM FORSIM IS A FORTRAN ORIENTED SIMULATION PROGRAM FOR THE CONTINUOUS TRANSIENT SOLUTION OF SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS. THE USER WRITES HIS EQUATIONS IN A FORTRAN SUBROUTINE, FOLLOWING PRESCRIBED RULES, AND LOADS THIS ROUTINE ALONG WITH THE EXECUTIVE ROUTINES. THE EXECUTIVE ROUTINES THEN READ IN INITIAL DATA SUPPLIED BY THE USER AND PROCEED WITH THE INTEGRATION.

515 GENED ENVIRONMENTAL ROUTINES THE GENED ENVIRONMENTAL ROUTINES CONSIST OF A SET OF STANDARD ROUTINES WRITTEN AT THE GENERAL ELECTRIC NUCLEAR ENERGY DIVISION AND A SET OF STANDARD GE635 SYSTEM ROUTINES. THE FIRST SET INCLUDES THE FOLLOWING -

BITA MOVES BITS FROM ONE WORD TO ANOTHER WITHOUT ALTERING THOSE BITS OUTSIDE THE RANGE OF THE CALL.

CASE POSITIONS AN INPUT FILE SO THAT THE INPUT DATA FOLLOWING A CASE CARD CAN BE READ.

CASERR ASSUMES THAT AN ERROR WAS DETECTED IN THE LAST DATA CASE AND FORCES THE CASE SUBROUTINE TO ADVANCE THE DATA INPUT FILE TO THE NEXT INDEPENDENT CASE CARD OR TO THE END OF THE INPUT DATA, WHICHEVER OCCURS FIRST.

DRAW IS A GENERAL-PURPOSE PLOTTING ROUTINE USED TO (A) DRAW A GRID NETWORK, (B) LABEL THE GRID NETWORK, (C) DRAW CURVES WITHIN THE GRID NETWORK, (D) ALLOW TWO DIFFERENT Y-AXIS VALUES, AND (E) PRODUCE A BAR OR HISTOGRAM PLOT.

ERRSYS IS A GENERAL ERROR INDICATING ROUTINE THAT SETS UP DIAGNOSTIC INFORMATION FOR USE IN ERROR RECOVERY WITHIN PROGRAM SYSTEMS.

F4TRBK PROVIDES A TRACE OF CALLING PROGRAMS FROM LEVEL TO LEVEL UP TO THE ORIGINAL CALLING LEVEL. F4TRAC PRINTS OUT A TRACE AND THEN RETURNS TO THE STATEMENT AFTER THE CALL TO F4TRAC. F4TRIC PROVIDES THE NAME OF THE PROGRAM WHICH CALLED ERRSYS.

FLEXC WRITES A MESSAGE ON THE ON-LINE TYPEWRITER DURING PROGRAM EXECUTION TO SERVE AS A GUIDE TO THE OPERATOR OR USER.

FLTBCD CONVERTS A FORTRAN FLOATING-POINT NUMBER TO A BCD NUMBER IN EITHER F OR E FORMAT.

FSNOW IS A SPECIAL SUBROUTINE TO SAVE A FILE CODE IN THE CELL .SPFC.

FSUP PERMITS THE USER TO SUPPRESS A FLOATING-POINT NUMBER OR BINARY CONFIGURATION WHEN PRINTING OR PUNCHING WITH FORTRAN I/O.

FSUPC IS CALLED TO DISABLE THE SUPPRESS FUNCTION PERFORMED BY FSUP AND RETURN TO NORMAL FORTRAN I/O PROCESSING.

HELP IS USED TO SUPPLY A USER WITH THE TYPE OF DEVICE (TAPE/DISC/DRUM) AND THE NUMBER OF LINKS USED IF THE DEVICE IS A DISC OR DRUM UNIT.

IDFTAP CREATES A LOGICAL UNIT DESIGNATOR (REFERRED TO AS A LUD), FROM THE INFORMATION GIVEN TO THE IDFTAP FUNCTION BY THE USER, AND RETURNS THE LUD TO THE USER.

ISERVE IS A FUNCTION WITH VARIOUS OPTIONS TO PICK UP AND/OR CONVERT ONE OF THE FOLLOWING - DATE, CLOCK TIME, CASE NUMBER, USER IDENTIFICATION, AND COMPUTER PROCESSOR TIME.

ISUP PERMITS THE USER TO SUPPRESS A FIXED-POINT NUMBER OR BINARY CONFIGURATION WHEN PRINTING OR PUNCHING WITH FORTRAN I/O.

ISUPC IS CALLED TO DISABLE THE SUPPRESS FUNCTION PERFORMED BY ISUP AND RETURN TO NORMAL FORTRAN I/O PROCESSING.

LIMRTN PERMITS THE USER TO REGAIN CONTROL AFTER AN I8 ABORT (RUNNING TIME EXCEEDED) OCCURS, ALLOWING THE PROGRAM AN ADDITIONAL 5 MINUTES OF PROCESSOR TIME.

LISTFORM CONSISTS OF TWO SUBPROGRAMS, JGEGEN AND JGEOUT, AND ENABLES THE FORTRAN USER TO WRITE OUTPUT TAPES (FOR PRINTING OR PUNCHING) IN A MORE EFFICIENT AND FASTER MANNER THAN IS POSSIBLE WITH A FORTRAN WRITE (I,N) LIST STATEMENT, WHICH MUST SCAN THE FORMAT STATEMENT EACH TIME OUTPUT IS INITIATED.

LOCF4 IS A FUNCTION USED TO CONVERT THE ADDRESS OF A VARIABLE

OR AN ARRAY INTO A FORTRAN INTEGER.

NBCDFX CONVERTS A BCD NUMBER, INCLUDING THE SIGN, TO A FORTRAN INTEGER.

NFXBCD CONVERTS A FORTRAN INTEGER TO A BCD NUMBER.

NIPS INTERPRETS AN ARRAY OF BCD CHARACTERS IN INTEGER, REAL, OR HOLLERITH FORMAT.

NPOST IS A MULTIPLE ENTRY SUBROUTINE INCORPORATING THE FUNCTIONS OF VTAB, REWIND, POSWDS, POSLIN, POSTMW, POSASN, POSPOS, PRID, PWID, POSTSF, POSTSB, POSTRB, AND POSTWB. IT SERVES AS A DRIVER TO RWSBT FOR GROUPS OF DATA WHICH ARE UNIQUELY DEFINED ON A PHYSICAL DEVICE CALLED A LINE (A DISK, DRUM, OR TAPE FILE).

NSORT PROVIDES A FLEXIBLE ASCENDING-ORDER SORTING CAPABILITY TO A FORTRAN PROGRAM THAT REQUIRES A TAPE OR DISC SORT.

PLOTRC PROVIDES A SERIES OF CALCOMP PLOTTER ROUTINES. THESE INCLUDE PENSET, PSCALE, SPLOT, IPLOT, IDPLOT, XCPLOT, YCPLOT, PMARK, AND PENEND.

PRNTHD CAUSES A PRINTER OUTPUT HEADING TO BE WRITTEN AT THE TOP OF A NEW PAGE.

REREAD ALLOWS THE USER TO RE-READ (RE-FORMAT) THE LAST BCD RECORD READ IN, UNDER A DIFFERENT FORMAT CONTROL. CONVRT PERMITS CHARACTER MANIPULATION AND CONVERSION OF ANY DATUM/DATA IN MEMORY.

RWSBT MANIPULATES INFORMATION IN BINARY FORM ON TAPE, DISC, OR DRUM PHYSICAL DEVICES. IT INCLUDES BLKSIZ, RDBT, WTBT, SBITF, SBITB, RWD, RWDLC, AND MOVEBT.

VAMPIR PROVIDES THE COMPLETE SETUP OF LINEAR GRAPHS TO BE PRODUCED ON A DIGITAL PLOTTER.

ZERO CAUSES DIVISION BY ZERO TO YIELD A FIXED OR FLOATING POINT ZERO AS THE DIVIDEND INSTEAD OF THE MACHINES MAXIMUM. IT ALSO SUPPRESSES THE ASSOCIATED DIVIDE CHECK AND ERROR MESSAGES.

THE SET OF STANDARD GE635 SYSTEM ROUTINES INCLUDE -

DUMP WHICH DUMPS THE INDICATED LIMITS OF CORE STORAGE AND TERMINATES EXECUTION BY RETURNING CONTROL TO THE OPERATING SYSTEM.

PDUMP WHICH DUMPS THE INDICATED LIMITS OF CORE STORAGE AND THEN CONTINUES EXECUTION.

LINK WHICH ENABLES THE PROGRAMMER TO CALL PROGRAM OVERLAYS AND LLINK WHICH LOADS A LINK AND THEN RETURNS TO THE NEXT SEQUENTIAL STATEMENT OF THE CALLING ROUTINE.

FLGEOF WHICH IS USED TO PROCESS END-OF-FILE CONDITIONS.

516 PTAC11 PTAC11 ALLOWS A PROGRAMMER TO ASSEMBLE BINARY CODE FOR THE DIGITAL EQUIPMENT CORPORATION PDP-11 COMPUTER ON THE IBM360/75, TAKING ADVANTAGE OF THE FACILITIES AND SPEED OF THE LARGER MACHINE.

518 ERREST ERREST SORTS THE ROD BUNDLE LIBRARY OF CRITICAL HEAT FLUX DATA AND PERFORMS ERROR CALCULATIONS ON SORTED SUBSETS.

519 NRTS OS/360 REMOTE JOB ENTRY NRTS ALLOWS USERS AT REMOTE LOCATIONS TO SUBMIT JOBS OVER SLOW OR HIGH SPEED COMMUNICATION LINES TO AN IBM SYSTEM 360/75 USING THE OPERATING SYSTEM THAT PROVIDES MULTIPROGRAMMING WITH A VARIABLE NUMBER OF TASKS. THIS PROGRAM IS AN EXTENSION OF THE STANDARD RJE PROGRAM. ONCE A JOB HAS BEEN ENTERED EXECUTION PROCEEDS UNDER OS JOB MANAGEMENT ROUTINES.

534 EISPACK EISPACK IS A COLLECTION OF FORTRAN SUBROUTINES TO SOLVE THE STANDARD EIGENPROBLEM FOR ANY ONE OF THE FOLLOWING CLASSES OF MATRICES - REAL GENERAL, CERTAIN REAL TRIDIAGONAL, REAL SYMMETRIC, REAL TRIDIAGONAL SYMMETRIC, COMPLEX GENERAL AND COMPLEX HERMITIAN MATRICES. THE INDIVIDUAL SUBROUTINES ARE -

IDENTIFICATION		DESCRIPTION
BALANC	E2F269	BALANCE A REAL GENERAL MATRIX
BALBAK	E2F270	BACK TRANSFORM VECTORS OF MATRIX FORMED BY BALANC
CBAL	E2F271	BALANCE A COMPLEX GENERAL MATRIX
CBABK2	E2F272	BACK TRANSFORM VECTORS OF MATRIX FORMED BY CBAL
ELMHES	E2F273	REDUCE REAL MATRIX TO REAL HESS. (ELEMENTARY)
ELMBAK	E2F274	BACK TRANSFORM VECTORS OF MATRIX FORMED BY ELMHES
ORTHES	E2F275	REDUCE REAL MATRIX TO REAL HESS. (ORTHOGONAL)
ORTBAK	E2F276	BACK TRANSFORM VECTORS OF MATRIX FORMED BY ORTHES
TRED1	E2F277	REDUCE SYM. MATRIX TO SYM. TRIDIAG.
TRED2	E2F278	REDUCE SYM. MATRIX TO SYM. TRIDIAG.
TRBAK1	E2F279	BACK TRANSFORM VECTORS OF MATRIX FORMED BY TRED1
FIGI	E2F280	REDUCE NONSYM. TRIDIAG. MATRIX TO SYM. TRIDIAG.
BAKVEC	E2F281	BACK TRANSFORM VECTORS OF MATRIX FORMED BY FIGI
COMHES	E2F282	REDUCE COMPLEX MATRIX TO COMPLEX HESS.
COMBAK	E2F283	BACK TRANSFORM VECTORS OF MATRIX FORMED BY COMHES
HTRIDI	E2F284	REDUCE HERMITIAN MATRIX TO SYM. TRIDIAG.
HTRIBK	E2F285	BACK TRANSFORM VECTORS OF MATRIX FORMED BY HTRIDI
HQR	E2F286	FIND ALL VALUES OF REAL HESS. MATRIX
HQR2	E2F287	FIND ALL VALUES/VECTORS OF REAL HESS. MATRIX
INVIT	E2F288	FIND SOME VECTORS OF REAL HESS. MATRIX
TQL1	E2F289	FIND ALL VALUES OF SYM. TRIDIAG. MATRIX
TQL2	E2F290	FIND ALL VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
IMTQL1	E2F291	FIND ALL VALUES OF SYM. TRIDIAG. MATRIX
IMTQL2	E2F292	FIND ALL VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
TSTURM	E2F293	FIND SOME VALUES/VECTORS OF SYM. TRIDIAG. MATRIX
BISECT	E2F294	FIND SOME VALUES OF SYM. TRIDIAG. MATRIX
COMLR	E2F295	FIND ALL VALUES OF COMPLEX HESS. MATRIX
COMLR2	E2F296	FIND ALL VALUES/VECTORS OF COMPLEX HESS. MATRIX
CINVIT	E2F297	FIND SOME VECTORS OF COMPLEX HESS. MATRIX
RATQR	E2F298	FIND EXTREME VALUES OF SYM. TRIDIAG. MATRIX
ELTRAN	E2F220	ACCUMULATE TRANSFORMATIONS FROM ELMHES (FOR HQR2)
ORTRAN	E2F221	ACCUMULATE TRANSFORMATIONS FROM ORTHES (FOR HQR2)
FIGI2	E2F222	REDUCE NONSYM. TRIDIAG. MATRIX TO SYM. TRIDIAG.
TINVIT	E2F223	FIND SOME VECTORS OF SYM. TRIDIAG. MATRIX
EISPAC	E2F299	CONTROL PROGRAM FOR EISPACK

541 WSP-HASP/DOS THE WSP (WORK STATION PACKAGE) IS A MODIFICATION OF THE STANDARD HASP/RMT360 PACKAGE SUPPLIED BY IBM AND RUNS ON A MULTIPROGRAMMED DOS SYSTEM/360/30 USING MULTI-LEAVING AND BINARY SYNCHRONOUS COMMUNICATIONS TO COMMUNICATE WITH A SYSTEM/360/195/ASP CENTRAL CPU.

556 KEELE KEELE IS A LINEARLY CON-
STRAINED NONLINEAR PROGRAMMING ALGORITHM FOR LOCATING A LOCAL
MINIMUM OF A FUNCTION OF N VARIABLES WITH THE VARIABLES SUBJECT TO
LINEAR EQUALITY AND/OR INEQUALITY CONSTRAINTS.

562 AMDLIBAE AMDLIBAE IS A SUBSET OF THE IBM 360 SUBROUTINE LIBRARY AT THE APPLIED MATHEMATICS DIVISION AT ARGONNE NATIONAL LABORATORY. THIS SUBSET INCLUDES LIBRARY CATEGORIES A-E:

IDENTIFICATION		DESCRIPTION
A152S A	MPA	MULT. PREC. FLOATING POINT ARITH. PACKAGE
B156S A	ARSIN	ARCSINE, ARCCOSINE
B157S A	SIN/COS	SINE, COSINE
B158S A	DSIN/DCOS	DP SINE, COSINE
B159S A	DTAN/DCOT	DP TANGENT, COTANGENT
B252S A	SINH/COSH	HYPERBOLIC SINE, COSINE
B353S A	ALOG	SP LOGARITHM
B354S A	DEXP	DP EXPONENTIAL
B355S A	DLOG	DP LOGARITHM
B456S A	DCUBRT	DP CUBE ROOT
B457S A	ARGPOWER	X**Y
B458S A	ARGFOXPO	DP X**Y
C150S F	DOD	Q. D. ALGORITHM APPLIED TO A POWER SERIES
C151S F	DCONF1	EVAL. CONT. FRACT. Q. D. OF POWER SERIES
C250S F	CUBIC	ROOTS OF CUBIC POLYNOMIAL EQUATION
C251S F	QUARTIC	ROOTS OF QUARTIC POLYNOMIAL EQUATION
C252S F	RSSR	ALL ROOTS OF POLY EQS. WITH REAL COEF.
C253S F	POLDRV	DRIVER FOR C254S
C254S F	CPOLY	ROOTS ARB. POLY. JENKINS-TRAUB ALGORITHM
C353S F1		ANG. MOM. COEF.- CLEBSCH, RACAH, WIGNER
C354S A	ELLIPK	SP COMPLETE ELLIPTIC INTEGRAL K
C355S A	ELLIPE	SP COMPLETE ELLIPTIC INTEGRAL E
C365S A	ALGAMA	LOGARITHM OF THE GAMMA FUNCTION
C366S A	DGAMMA/DLGAMA	DP GAMMA AND LOG(GAMMA) FUNCTIONS
C367S A	GAMMA/ALGAMA	GAMMA AND LOG(GAMMA) FUNCTIONS
C368S F	EONE	EXPONENTIAL INTEGRAL E1
C369S F	DEONE	DP EXPONENTIAL INTEGRAL E1
C370S F	BESJY	BESSEL FUNCTIONS J AND Y
C371S F	BESIK	BESSEL FUNCTIONS I AND K
C372S F	CHIPRB	CHI-SQUARE INTEGRAL
C373S A	DELIPK	DP COMPLETE ELLIPTIC INTEGRAL K
C374S A	DELIPE	DP COMPLETE ELLIPTIC INTEGRAL E
C375S F1	CEI	EXPONENTIAL INTEGRALS IN LONG PRECISION
C377S F1	DDAW	DAWSON'S INTEGRAL IN DOUBLE PRECISION
C380S F	DRZETA	LONG PRECISION ZETA, ZETA-1 FUNCTIONS
C382S F	DCGAM	LONG PRECISION COMPLEX GAMMA
C383S A	DERF/DERFC	DP ERROR FUNCTION
C384S F	BEJ1	BESSEL FUNCTION J1
C385S F	COULMB	REGULAR COULOMB WAVE FUNCTIONS
C386S F1	DSCMAL	COULOMB PHASE SHIFT
C387S F	BEJYR	BESSEL FUNCTIONS J0,J1,Y0,Y1
C388S F	IRCOUL	LP IRREGULAR COULOMB WAVE FUNCTIONS
C389S F	GAMIN	INCOMPLETE GAMMA FUNCTION
C390S F	LQ	ASSOC. LEGENDRE FUNCTIONS OF 2ND. KIND
C393S F	CDECNE	MODIFIED COMPLEX EXPONENTIAL INTEGRAL
D150S F	HAVIE	QUADRATURE BY HAVIE'S ALGORITHM
D150S P	HAVIEP	QUADRATURE BY HAVIE'S ALGORITHM
D151S F	ROMBRG	ROMBERG QUADRATURE
D151S P	ROMBRG	ROMBERG QUADRATURE
D152S F1	CHEB	CLENSHAW-CURTIS QUADRATURE

D153S	F	DRCMB	TWO-DIMENSIONAL RCMBERG QUACRATURE
D153S	P	DRCMBP	TWO-DIMENSIONAL ROMBERG QUACRATURE
D154S	F	CMCUAD	MCCIFIEC CLENSHAW-CURTIS CUACRATURE
D155S	F	SIMP	ADAPTIVE SIMPSON QUADRATURE
D157S	F	ASIMP	IMPRCVED ADAPTIVE SIMPSCN CUADRATURE
D157S	P	ASIMPP	IMPRCVED ADAPTIVE SIMPSCN CUADRATURE
D158S	F	ANC4	ADAP. QUAD. USING 4-TH CRCER NEWTCN-CCTES
D158S	P	ANC4P	ACAP. QUAD. USING 4-TH CRCER NEWTCN-CCTES
D161S	F	GAUSS	ARBITRARY GAUSSIAN WEIGHTS AND NCDES
D162S	F	SQUANK	SIMPSON'S QUAD. USED ADAPTIVELY
D252S	F	DDFSUB	CP NEVILLE OR STOER SCL. LIN. DIF. EQNS.
D253S	F	DDFSYS	CRIVER FCR D252S
D254S	F	DEGEAR	GEAR'S SOL. CF DIF. EQS.
D255S	F	DFBND	STOER SOL. DIF. EQS. WITH ERROR BCUNDS
D256S	F	DFBDRV	CRIVER FCR D256
E206S	F	LSQPOL	LEAST SQUARES WEIGHTED POLYNOMIAL FIT
E208S	F1		ARBITRARY FUNCTICN FIT, LEAST SQUARES
E209S	F	CALLSQ	CRIVER FOR E206S
E212S	F		GENFRAL LEAST SQUARES FIT + FNCTICN EVAL.
E250S	F	VA02A	LEAST SQUARES FUNCT. MIN. W/O DERIVATIVES
E252S	F	MINMAX	CHEBYSHEV LINE FIT
E253S	F		ARBITRARY FUNCTICNAL FIT II
E256S	F	BGPCL	LEAST SQUARES FIT WITH PCLYNOMIALS
E257S	F	BGLSSQ	LEAST SQUARES FIT WITH ARBITRARY FUNCTION
E350S	F	SMOCTH	SMOOTHING BY CURIC SPLINES

563 AMDLIBF AMDLIBF IS A SUBSET OF THE IBM 360 SUBROUTINE LIBRARY AT THE APPLIED MATHEMATICS DIVISION AT ARGONNE. THIS SUBSET INCLUDES LIBRARY CATEGORY F:

IDENTIFICATION		DESCRIPTION
F105S F	MATEQ,UNIQUE	GENERALIZED MAT. INV. AND SCL. LIN. EQS.
F150S F	HERM	EIGENSYSTEMS OF HERMITIAN MATRICES
F152S F	SYMINV	INVERT SYM. MATRICES, SOLVE LIN. SYSTEMS
F154S A	DOTP	DOUBLE PLUS PRECISION ACCUM. INNER PROD.
F155S F	HESSEN	RED. COMPLEX NON-HERM. MAT. TO UP. HESS.
F156S F	RAYCOR	RAYLEIGH CORRECTIONS FOR EIGENVALUES
F157S F	SINGLVL	SINGULAR VALUE DECOMP. OF REAL MATRIX
F161S F	XTRADP	A FAST EXTENDED PRECISION INNER PRODUCT
F202S F1	EIGEN	EIGENSYSTEM FOR REAL SYMMETRIC MATRIX
F203S F		DRIVER FOR F202S
F220S F	ELTRAN	ACCUM. TRANSFORMATIONS FROM ELMHES (HQR2)
F221S F	ORTRAN	ACCUM. TRANSFORMATIONS FROM ORTHES (HQR2)
F222S F	FIGI2	REDUCE NONSYM. TO SYM. TRIDIAG. (TQL2)
F223S F1	TINVIT	FIND SOME EIGENVEC. OF SYM. TRIDIAG. MAT.
F224S F	REDUC	REDUCE GEN. SYM. EIGENPROB. AX-L*BX
F225S F	REBAK	BACKTRANSFORM VECTORS REDUC FORMED MATRIX
F226S F	BANDR	REDUCE BAND SYM. MATRIX TO SYM. TRIDIAG.
F227S F	BANDV	FIND EIGENVECTORS OF BAND SYM. MATRIX
F228S F	TRED3	REDUCE PACKED SYM. MAT. TO SYM. TRIDIAG.
F229S F	TRBAK3	BACKTRANSFORM VECTORS TRED3 FORMED MATRIX
F250S F	FRANCI	EIGENVALUES OF A REAL MATRIX
F251S F	FRANCC	EIGENVALUES OF COMPLEX MATRICES
F252S F	GEIGEN	GENERALIZED SYMMETRIC EIGENPROBLEM
F255S F	SDIAG	EIGENSYSTEM OF REAL SYM. DP MATRICES
F257S F	TSTMTZ	GENERATES TEST MATRICES
F258S F	LRCHZ	EIG. VALS. REAL SYM. MAT. VIA LR-CHOLEC.
F259S F	BYSECT	EIGENVALUES OF TRIDIAG. MAT. BY BISECTION
F260S F	JACCBI	EIGENSYSTEM OF REAL MATRICES
F261S F	EIGINV	INVERSE EIGENVALUE PROBLEM
F262S F	VEC5	EIGENVECTORS OF PENTADIAG. SYM. MATRICES
F263S F	BANDRD	REDUCE SYM. BAND MATRIX TO TRIDIAG. FORM
F264S F	BANDVC	ORTHONORM. EIGENVEC. OF SYM. BAND MAT.
F265S F	EIGENP	EIGENSYSTEM OF REAL GENERAL MATRIX
F269S F1	BALANC	BALANCE A REAL GENERAL MATRIX
F270S F1	BALBAK	BACKTRANSFORM VECTORS BALANCE FORMED MAT.
F271S F1	CBAL	BALANCE A COMPLEX GENERAL MATRIX
F272S F1	CBABK2	BACKTRANSFORM VECTORS CBAL FORMED MATRIX
F273S F1	ELMHES	REDUCE REAL MATRIX TO REAL HESS. (ELEM.)
F274S F1	ELMBAK	BACKTRANSFORM VECTORS ELMHES FORMED MAT.
F275S F1	ORTHES	REDUCE REAL MAT. TO REAL HESS. (ORTHOG.)
F276S F1	ORTBAK	BACKTRANSFORM VECTORS ORTHES FORMED MAT.
F277S F1	TRED1	REDUCE SYM. MATRIX TO SYM. TRIDIAG.
F278S F1	TRED2	REDUCE SYM. MAT. TO SYM. TRIDIAG. (TQL2)
F279S F1	TRBAK1	BACKTRANSFORM VECTORS TRED1 FORMED MATRIX
F280S F1	FIGI	REDUCE NONSYM. TO SYM. TRIDIAG. MATRIX
F281S F1	BAKVEC	BACKTRANSFORM VECTORS FIGI FORMED MATRIX
F282S F1	COMHES	REDUCE COMPLEX MATRIX TO COMPLEX HESS.
F283S F1	COMBAK	BACKTRANSFORM VECTORS COMHES FORMED MAT.
F284S F1	HTRIDI	REDUCE HERMITIAN MATRIX TO SYM. TRIDIAG.
F285S F1	HTRIBK	BACKTRANSFORM VECTORS HTRIDI FORMED MAT.
F286S F1	HQR	FIND ALL VALUES OF REAL HESS. MATRIX

F287S	F1	HQR2	FIND ALL VALLES/VECTCRS REAL HESS. MAT.
F288S	F1	INVIT	FIND SOME VECTORS OF REAL HESS. MATRIX
F289S	F2	TQL1	FIND ALL VALUES CF SYM. TRICIAG. MATRIX
F290S	F2	TQL2	ALL VALUES/VECTORS SYM. TRICIAG. MAT.
F291S	F1	IMTQL1	FIND ALL VALUES CF SYM. TRICIAG. MATRIX
F292S	F1	IMTQL2	ALL VALUES/VECTORS SYM. TRICIAG. MAT.
F293S	F1	TSTURM	SCME VALUES/VECTCRS SYM. TRIDIAG. MAT.
F294S	F2	BISFCT	FIND SOME VALUES OF SYM. TRIDIAG. MATRIX
F295S	F1	COMLR	FIND ALL VALUES CF CCMPLEX HESS. MATRIX
F296S	F1	COMLR2	ALL VALUES/VECTCRS CCMPLEX HESS. MAT.
F297S	F1	CINVIT	FIND SOME VECTORS OF COMPLEX HESS. MATRIX
F298S	F1	RATCR	FINC EXTREME VALUES OF SYM. TRIDIAG. MAT.
F299S	FA1	EISPAC	CCNTRCL PROGRAM F220S-F223S + F269S-F298S
F402S	F	MATINV	MATRIX INVERSICN AND SCL. CF LINEAR ECNS.
F403S	F		CRIVER FOR F402S
F452S	F	CHCLLU,CHOLEQ	SYM. CECOMP. CF PCS. DEF. EAND MATRICES
F453S	F	MATINC	INVERSION CF COMPLEX MATRICES
F454S	F	CRCUT	SCLUTION CF SIMULTANECUS LINEAR ECUATICNS
F455S	F	CROUTC	SCL. OF SIMULTANEOUS COMPLEX LINEAR ECNS.
F456S	F1	DIAG	INTEGER PRESERVING GAUSSIAN ELIMINATICN

564 AMDLIBGZ AMDLIBGZ IS A SUBSET OF THE IBM 360 SUBROUTINE LIBRARY AT THE APPLIED MATHEMATICS DIVISION AT ARGONNE NATIONAL LABORATORY. THIS SUBSET INCLUDES LIBRARY CATEGORIES G-Z:

IDENTIFICATION	DESCRIPTION
G552S F RANF	RANDOM NUMBER GENERATOR
J552S F1 PLOTSFLM	CALCOMP PLOTS TO IBM 2280
J952S F YOLYPLOT	CALCOMP PLOTS
J955S P GRAF	PRINTS A GRAPH OF POINTS ON LINE PRINTER
K250S A1	CORE TO CORE CONVERSION
K251S A HEXINP	HEXADECIMAL INPUT FOR PL/I PROGRAMS
K252S A HEXOUT	HEXADECIMAL OUTPUT CONV. PL/I PROGRAMS
M101S F SORT	ALGEBRAIC SORT
M150S F CSORT	ALGEBRAIC SORT
M151S P2 ANLKWIC	KWIC SORT
M250S A SMALLIST	SQUEEZES ASSEMBLER LISTING TO 8X11
N251S A ABEND	CALLS ABEND DUMP
QC52S A CLOCK	TIME
Q053S A COPYAGO	COPY LOAD MODULE FROM TAPE TO DISK
Q054S A DATE	CURRENT DATE IN FORM MM/DD/YY
Q055S A TIME	TIME (24 HOUR CLOCK) IN EBCDIC HH.MM.SS
Z013S F	VARIABLE METRIC MINIMIZATION
Z057S A LOCF	LOCATE MACHINE ADDRESSES OF VARIABLES
Z071S A ALLOC	ALLOCATE LCS FOR FORTRAN PROGRAMS
Z073S A LCSGET	ALLOCATE LCS FOR PL/I PROGRAMS
Z074S A ANLMNP	EXPONENT + MANTISSA MANIPULATIVE FUNCTS.

578 PLOTR PLOTR AND THE AUXILIARY ROUTINE XYGRD CONTOUR A FUNCTION DEFINED OVER A TWO-DIMENSIONAL GRID AND COMPUTE THE AREA WITHIN THE CONTOURS.

592 GEAR GEAR IS A PACKAGE OF SUBROUTINES FOR THE NUMERICAL SOLUTION OF SYSTEMS OF ORDINARY DIFFERENTIAL EQUATIONS, GIVEN THE INITIAL VALUES. IT IS PARTICULARLY WELL-SUITED FOR STIFF SYSTEMS, BUT CAN BE USED GENERALLY.

593 TSO-SPEAKEASY SPEAKEASY IS A GENERAL-PURPOSE LANGUAGE PROCESSOR OPERATING AS A SUPER DESK CALCULATOR UNDER OS, TSO AND VM/CMS.

601 ERF,ERFC ERF AND ERFC ARE USED TO COMPUTE VALUES OF THE ERROR FUNCTION AND COMPLEMENTARY ERROR FUNCTION FOR ANY REAL NUMBER. THEY MAY BE USED TO COMPUTE OTHER RELATED FUNCTIONS SUCH AS THE NORMAL PROBABILITY INTEGRALS.

602 LENSDES LENSDES ANALYZES THE PERFORMANCE OF OPTICAL LENSES BY COMPUTING THE IMAGE ERRORS FOUND WHEN BUNDLES OF SKEW RAYS ARE TRACED FROM OBJECT POINTS TO THE IMAGE SURFACE. LENS PERFORMANCE IS OPTIMIZED BY VARYING SELECTED LENS PARAMETERS UNDER DIRECTION OF THE NONLINEAR LEAST SQUARES PROGRAM, OPTIMIZ.

610 FUNPACK FUNPACK IS A COLLECTION OF FORTRAN SUBROUTINES TO EVALUATE CERTAIN SPECIAL FUNCTIONS. THE INDIVIDUAL SUBROUTINES ARE -

IDENTIFICATION		DESCRIPTION
DEI	F1EI	EXPONENTIAL INTEGRALS
DELIPK	F1EK	COMPLETE ELLIPTIC INTEGRAL OF THE FIRST KIND
DELIPE	F1EE	COMPLETE ELLIPTIC INTEGRAL OF THE SECOND KIND
DAW	F1DW	DAWSON'S INTEGRAL
BESKO	F1KO	BESSEL FUNCTION K-SUB-0
BESK1	F1K1	BESSEL FUNCTION K-SUB-1
MONERR	F1MO	ERROR MONITORING PACKAGE

613 NRTS ENVIRONMENTAL SUBROUTINES THE NRTS ENVIRONMENTAL SUBROUTINES ARE A COLLECTION OF ROUTINES DESIGNED TO AID THE PROGRAMMER BY PROVIDING EXTENSIONS TO THE FORTRAN LANGUAGE, DATA MANAGEMENT SERVICES, AND PROGRAMMING AIDS.

ASTEM EVALUATES THE 1967 ASME EQUATIONS OF STATE FOR WATER/STEAM AND DERIVATIVES OF THESE EQUATIONS.

DOUT EXTRACTS DECKS FROM A FILE AND WRITES EACH DECK AS A SEPARATE FILE SO THAT THEY CAN BE PROCESSED BY THE ASSEMBLER WHICH CAN HANDLE ONLY ONE DECK PER STEP.

UMRG IS USED TO MERGE PARTS OF UPDATE TAPES.

UPD IS USED TO UPDATE SOURCE DECKS.

STHG GENERATES WATER THERMODYNAMIC PROPERTY TABLES.

AND, IAND, DAND, OR, IOR, AND DOR GIVE THE LOGICAL PRODUCT (AND) AND LOGICAL SUM (OR) FOR 4 AND 8-BYTE WORDS.

CVI CONVERTS EBCDIC INFORMATION TO BINARY INFORMATION.

COMPAR COMPARES A CHARACTER STRING BEGINNING AT LOCATION A(I) WITH ANOTHER CHARACTER STRING BEGINNING AT LOCATION B(J). THE COMPARISON IS MADE ONE CHARACTER AT A TIME AND TERMINATED AFTER ALL REQUESTED CHARACTERS ARE TESTED OR AFTER THE FIRST INEQUALITY IS FOUND.

DATE CONVERTS THE JULIAN DATE MAINTAINED BY THE OS OPERATING SYSTEM INTO THE FORM MM/DD/YY WHERE MM IS THE MONTH, DD THE DAY, AND YY THE YEAR.

FABEND CAUSES AN ABNORMAL TERMINATION OF THE JOB STEP, AND A CORE DUMP IS PRINTED IF A SYSUDUMP OR SYSABEND DD CARD IS INCLUDED IN THE JOB STEP JCL.

THE FETCH FUNCTION RETURNS THE VALUE OF THE VARIABLE WHOSE ADDRESS IS SPECIFIED AS THE ARGUMENT.

THE EXTENDED IBCOM# ROUTINE PROVIDES AUTOMATIC PAGE CONTROL, AND OPTIONALLY, PERMITS FROM ONE TO THREE LINES TO BE INSERTED AS PAGE HEADINGS IN THE OUTPUT TO A SPECIFIED SYSOUT UNIT.

THE INP SET OF SUBROUTINES, A DATA INPUT PACKAGE FOR USE WITH FORTRAN PROGRAMS, IS A CONVERSION OF THE INPF FORTRAN PACKAGE WRITTEN BY BETTIS FOR THE CDC6600 AND CAN BE USED IN THE CONVERSION OF BETTIS PROGRAMS THAT USE INPF.

INFILQ IS AN INCORE READ AND WRITE SUBROUTINE THAT MODIFIES IBCOM# IN SUCH A WAY THAT THE NEXT READ OR WRITE REQUEST CAUSES INFORMATION IN THE USER'S LIST TO BE PLACED IN A CORE BUFFER.

JBIDZZ RETURNS THE NAME OF THE JOB ENTERED ON THE NAME FIELD OF THE JOB CARD.

JULIAN RETURNS A 5-BYTE NUMERIC JULIAN DATE IN EBCDIC CHARACTERS FROM THE OS OPERATING SYSTEM.

LOCFCN RETURNS THE ABSOLUTE CORE ADDRESS OF THE VARIABLE SPECIFIED AS THE ARGUMENT.

MAINS AND MAIND ARE MATRIX INVERSION SUBROUTINES IN SINGLE- AND DOUBLE-PRECISION, RESPECTIVELY.

MOVE TRANSFERS DATA ASSUMED TO BE IN CHARACTER, FULL-WORD, OR DOUBLE-WORD FORM FROM ONE ARRAY TO A SECOND ARRAY.

RUNOUT CAN BE USED TO OBTAIN A SECOND COPY OF THE PRINTED OUTPUT.

ISL, ISR, ISRL, SL, SR, SRL, DSL, DSR, AND DSRL ARE ARITHMETIC AND LOGICAL SHIFT FUNCTIONS FOR 4 AND 8-BYTE WORDS.

THE INTERVAL TIME ROUTINE PROVIDES THE USER WITH THE MEANS OF DETERMINING THE ELAPSED TIME OF HIS TASK.

TYME WILL RETURN THE TIME OF DAY AS THE SECOND ARGUMENT.

VOLSER PROVIDES THE VOLUME SERIAL NUMBER(S), DATA SET NAME, AND CREATION DATE OF DATA SETS RESIDING ON PERIPHERAL DEVICES (DISK OR TAPE UNITS).

ZEROUT SETS TO ZERO AN ARBITRARY LENGTH OF SEQUENTIAL 8-BYTE WORDS BEGINNING ON A DOUBLE-WORD BOUNDARY.

THE FTB PACKAGE IS A SET OF SUBROUTINES FOR CONTROLLING DYNAMIC STORAGE ALLOCATION IN FAST CORE, BULK CORE, FOUR DISK DATA SETS, AND ONE DRUM DATA SET AND PERFORMING THE I/O OPERATIONS TO DISK AND DRUM STORAGE.

SUBROUTINE FLINK ALLOWS ACCESS TO THE LINK MACRO.

THE FIOSET ROUTINE IS USED TO OVERRIDE THE FORTRAN CONVENTION FOR NAMING DD CARDS.

REMTYM GIVES THE USER ACCESS TO HIS UNUSED CPU TIME.

THE STANDARD CALCOMP PLOTTER SUBROUTINES ARE ALSO PART OF THE PACKAGE.

THE INTEGRATED GRAPHICS SYSTEM (IGS) USED AT THE RAND CORPORATION TO SUPPORT AN SC4060 STORED-PROGRAM RECORDING SYSTEM IS ALSO INCLUDED.

614 HISTOGRAMS HISTOGRAMS PROVIDES GRAPHICAL REPRESENTATION OF LOT SAMPLE CHARACTERISTICS IN THE FORM OF HISTOGRAM BARS. ON LARGE LOT SAMPLES, IF A HISTOGRAM BAR SHOULD EXCEED FIFTY UNITS, THE ENTIRE HISTOGRAM PLOT IS AUTOMATICALLY SCALED BY THE SMALLEST INTEGER THAT WILL CAUSE THE LARGEST FREQUENCY TO FALL WITHIN THE MAXIMUM PLOT OF FIFTY UNITS. THE NUMBER OF CELLS IN THE HISTOGRAM CAN VARY FROM 3 TO 22. THE EQUAL INTERVALS ARE DETERMINED BY THE DIFFERENCE OF THE UPPER AND LOWER BOUNDARIES DIVIDED BY THE NUMBER OF CELLS LESS TWO. IN ADDITION TO THE PLOT, THE PROGRAM PROVIDES STATISTICAL CHARACTERISTICS IN THE FORM OF: THE MEAN, STANDARD DEVIATION, SKEWNESS, KURTOSIS, RANGE, NUMBER OF STANDARD DEVIATIONS BETWEEN THE MEAN AND THE TWO SPECIFICATION LIMITS, AND UP TO NINETEEN VALUES FALLING OUTSIDE THE BOUNDARY LIMITS.

621 BH99 BH99 IS USED FOR THE STATISTICAL ANALYSIS OF DATA BASED ON THE EXTREME VALUE DISTRIBUTION.

623 SETS SETS IS USED TO ACHIEVE THE SYMBOLIC MANIPULATION OF SET (OR BOOLEAN) EQUATIONS, PARTICULARLY THE REDUCTION OF SET EQUATIONS BY THE APPLICATION OF SET IDENTITIES.

624 GRAPH THIS PROGRAM CALCULATES AND GRAPHS STATISTICAL RESULTS OF EXPERIMENTAL DATA. IT CALCULATES THE LINEAR REGRESSION, CORRELATION COEFFICIENTS, THE CONFIDENCE INTERVALS FOR 90-95-99 PERCENT CONFIDENCE THAT THE NEXT SAMPLE WILL BE WITHIN THE PRINTED INTERVAL, THE 90 PERCENT CONFIDENCE INTERVAL THAT 95 PERCENT OF THE REMAINING POPULATION WILL BE WITHIN, AND THE MEAN AND STANDARD DEVIATION OF EACH PARAMETER. THE PROGRAM GRAPHS THESE CONFIDENCE INTERVALS, THE REGRESSION LINE AND THE EXPERIMENTAL DATA TO OBTAIN A VISUAL INDICATION OF CORRELATION. INPUT DATA IS PRINTED IN TABULAR FORM AND ALL DEPENDENT DATA ARE DISPLAYED AGAINST ALL INDEPENDENT DATA, ONE PARAMETER AT A TIME.

630 LATIN SQ LATIN SQ IS USED FOR THE STATISTICAL ANALYSIS OF DATA GENERATED FROM AN N X N LATIN SQUARE EXPERIMENTAL DESIGN. THE PROGRAM OUTPUT INCLUDES AN ANALYSIS OF VARIANCE TABLE FOR TESTING THE SIGNIFICANCE OF THE ROW, COLUMN AND TREATMENT MAIN EFFECTS. THE ANALYSIS OF VARIANCE TABLE ALSO INCLUDES INFORMATION FOR TESTING THE LINEAR AND HIGHER ORDER CURVILINEAR COMPONENTS FOR EACH MAIN EFFECT. A SUBROUTINE IS PROVIDED FOR PERFORMING DUNCAN'S NEW MULTIPLE RANGE TEST FOR MAKING ALL PAIR-WISE COMPARISONS AMONG THE FACTOR LEVEL MEAN VALUES.

633 LOS ALAMOS SUBROUTINE LIBRARY LOS ALAMOS SUBROUTINE LIBRARY IS A SUBSET OF THE CDC66CC SUBROUTINE LIBRARY OF LOS ALAMOS SCIENTIFIC LABORATORY. THIS SUBSET INCLUDES LIBRARY CATEGORIES A-W:

IDENTIFICATION		DESCRIPTION
A101A COM	UNPAK	UNPACK A FLOATING POINT NUMBER
A102A COM	IUNPK	UNPACK A FLOATING POINT NUMBER
A202A F4	DCABS	ABSOLUTE VALUE OF D.P. COMPLEX NUMBER
A203A COM	CABS	MAGNITUDE OF A COMPLEX NUMBER
B104A COM	ATAN	ARCTANGENT OF X OR OF Y/X
B106A COM	SINCOS	SINE OR COSINE FOR ARG. IN RAD. & DEG.
B107A F4	TAN	FL. PT. TANGENT OR COTANGENT ROUTINE
B108A COM	ASIN	ARCSINE OR ARCCOSINE
B109A COM	CSIN	SINE OR COSINE OF A COMPLEX NUMBER
B203A COM	SINH	HYPERBOLIC SINE & COSINE
B204A COM	TANH	HYPERBOLIC TANGENT
B306A COM	EXP	EXPONENTIAL FUNCTION E**X
B307A COM	CLOG	COMPLEX NATURAL LOG
B310A COM	CEXP	NATURAL EXPONENTIAL OF A COMPLEX NUMBER
B313A COM	CBAIEX	EVAL. DX**N WHERE DX IS D.P. & N IS INT.
B407A COM	CUBRT	CUBE ROOT FORTRAN IV SINGLE PRECISION
B408A COM	SQRT	SQUARE ROOT
B409A COM	CSQRT	COMPLEX SQUARE ROOT OF A COMPLEX NUMBER
C302A F4	GAMMA	INCOMPLETE GAMMA FUNCTION
C304A F4	ELLI	COMPLETE & INCOMPLETE ELLIPTIC INTEGRALS
C309A F4	E1	EXPONENTIAL INTEGRAL E1(X)
C310A F4	ERF	ERROR FUNCTION
C325A F4	GAM1	GAMMA FUNCTION
C326A F4	LNGAM	CMPLX NAT. LOG OF GAMMA FN. WITH CMPLX ARG.
C327A F4	BASF	BESSEL FUNCTIONS FOR LARGE REAL ARGUMENTS
C328A F4	BJYIK	BESSEL FNS. FOR REAL ORDER & ARGUMENT
D301A F4	TBPSON	TRUNCATED BONEMAN*POISSON SOLVER
E102A F4	SPL1D1	SPLINE INTERPOLATION-COEFFICIENT EVAL.
E103A F4	SPL1D2	SPLINE INTERPOLATION-FUNCTION EVALUATION
E104A F4	SPL2D1	2-D BI-CUBIC SPLINE INTERP.-COEFF. CALC.
E105A F4	SPL2D2	2-D BI-CUBIC SPLINE INTERP.-FUNCT. EVAL.
E106A F4	AKNINT	INTERPOLATION BY AITKENS REPEATED PROCESS
E107A F4	SPL2D3	SPLINE INTERP. FN. TO BE USED WITH E105A
E203A F4	SMOOTH	LEAST-SQUARE SPLINE APPROXIMATION
E208A F4	PFTS	ORTHOGONAL POLYNOMIAL LEAST SQUARES
F115A F4	MAXV	VECTOR MAX., MIN., MAX. ABS. OR MIN. ABS.
F116A F4	MAXM	MATRIX MAX., MIN., MAX. ABS., MIN. ABS.
F119A F4	MATTRS	MATRIX TRANSPOSE IN PLACE
F120A F4	MATMOV	MATRIX MOVE
F121A F4	MATTRA	MATRIX MOVE & TRANSPOSE
F122A F4	MATMPY	MATRIX MULTIPLY ROUTINE
F123A F4	MTMPY	MATRIX TRANSPOSE MULTIPLY ROUTINE
F124A COM	DOTPRO	INNER PRODUCT OF TWO VECTORS (DOT PRODUCT)
F128A F4	MGS	MODIFIED GRAM-SCHMIDT ORTHOGONALIZATION
F132A F4	MATINV	MATRIX INVERSE
F133A COM	VECSUM	VECTOR ADDITION
F134A F4	ECMATPY	ECS MATRIX MULTIPLY
F135A F4	ECMTRPY	ECS MATRIX TRANSPOSE MULTIPLY
F136A F4	CDTPRO	INNER PRODUCT OF TWO COMPLEX VECTORS
F137A F4	CATINV	COMPLEX MATRIX INVERSION
F139A COM	ADDVEC	VECTOR ADDITION

F222A	F4	SMEVAL	EIGENVALUE ROUTINE--REAL SYMMETRIC MATRIX
F223A	F4	SMHHTR	TRIDIAGONALIZE REAL SYMMETRIC MATRIX
F224A	F4	SMEVEV	EIGENVAL/EIGENVEC ROUT. FOR REAL SYMM. MTRX
F225A	F4	PRODHH	CPUTE TRANSFORM TO TRIDIAG. A SYMM. MATRIX
F226A	F4	HMEVAL	EIGENVALUE ROUTINE--CMPLX HERMITIAN MTRX
F227A	F4	HMHHTR	TRIDIAGONALIZE COMPLEX HERMITIAN MATRIX
F228A	F4	HMEVEV	EIGENVAL/EIGENVEC ROUT. FOR HERMITIAN MTRX
F229A	F4	PROHHH	CPUTE TRANSFORM TO TRIDIAG. HERMITIAN MTRX
F230A	F4	BISECT	CPUTE SUBSET OF EIGENVALS OF TRIDIAG. MTRX
F404A	F4	LSS	LINEAR SYSTEM SOLVER
F405A	F4	GLSS	GENERAL LINEAR SYSTEM SOLVER
F409A	F4	MATFAC	LIN. SYST. SOLVER & MTRX FACTORIZATION(LU)
F410A	F4	LSSIT	ITERATIVE SOLUTION OF LINEAR SYSTEMS
F411A	F4	BANMAT	BAND MTRX FACTORIZATION & LIN. SYST. SOLVER
F413A	COM	ABTOSS	SYMM. CONSTANT TRIDIAG. LINEAR SYST. SOLVER
F414A	F4	SPERLSS	SYMMETRIC PERIODIC LINEAR SYSTEM SOLVER
F415A	F4	ECSGLSS	ECS GENERAL LINEAR SYSTEM SOLVER
F416A	F4	CATFAC	COMPLEX LINEAR SYSTEM SOLVER
F417A	F4	CLSIT	SOLN OF CMPLX LIN. SYST. BY ITERATIVE RFNMT
F418A	COM	FACTTD	LU DECOMP. OF DIAG. DOM. TRIDIAG. MATRIX
F419A	COM	SOLTDM	SOLVE DIAG. DOMINANT TRIDIAG. LINEAR SYSTEM
G601A	F4	SPCTRL	SPECTRAL ANALYSIS OF TIME SERIES
G602A	F4	ACFCN	AUTOCOVARIANCE/AUTOCORRELATION FUNCTION
G603A	F4	WINDOW	LAG-WINDOW GENERATOR
G604A	F4	PWRSPCT	POWER SPECTRUM COMPUTATION
I401A	F4	LOAD	LOAD FORTRAN IV FORMAT FREE INPUT
J506A	COM	ADV	ADVANCE FILM
J510A	F4	ASCL	AUTOMATIC GRAPH SCALING
J516A	COM	PLT	PLOT A POINT
J517A	COM	DRV	DRAW VECTOR
J518A	COM	GXA	GENERATE X OR Y AXIS
J520A	COM	TSP	TYPE SPECIFIC POINT
J521A	COM	TCP	TYPE CURRENT POINT
J522A	COM	TSPV	TYPE SPECIFIED POINT VERTICALLY
J523A	COM	FRAME	DRAW FRAME
J524A	COM	STB	STORE WORD IN BUFFER
J526A	F4	CONVRT	CONVERT TO 4020 COORDINATE
J527A	F4	TCR	TEST COORDINATE FOR RANGE
J528A	COM	DGA	DEFINE GRAPH AREA
J529A	F4	DLNLN	DRAW LINEAR-LINEAR GRID
J530A	F4	DLNLG	DRAW COMBINATION OF LINEAR & LOG GRIDS
J533A	F4	SLLIN	SCALE LEFT SIDE LINEARLY
J535A	F4	SBLIN	SCALE TOP OR BOTTOM OF GRAPH LINEARLY
J540A	F4	SBLOG	SCALE ANY BOUNDARY OF GRAPH LOGARITHMICALLY
J541A	F4	PLOT	PLOT N POINTS
J542A	COM	WLCH	WRITE LARGE CHARACTERS HORIZONT. OR VERT.
J562A	F4	PLOJR	STANDARDIZED PLOT ON FILM
J565A	COM	BS4020	DOUBLE BUFFER FILM OUTPUT
J567A	F4	DLCH	DRAW LARGE CHARACTERS
J569A	F4	COLOR	COLOR
J592A	F4,COM	PICTURE	PICT-PERSPEC PLOTS, HIDN LINES REMVD, COLOR
K203A	COM	ECR	ECR READS ONE WORD FROM ECS
K204A	COM	ECW	ECW WRITES ONE WORD TO ECS
M101A	F4	SORT1	EXTENDED SORT ROUTINE
M117A	F4	SORT2	TWO LEVEL EXTENDED SORT ROUTINE
M118A	F4	SEARCH	RAPID SEARCH OF A FLOATING POINT TABLE
M119A	F4,COM	ESEARCH	BINARY SEARCH THROUGH EXTENDED CORE STORAGE
M401A	COM	SHIFT	SHIFT WORD W/O ZERO END AROUND OR SIGN EXT.
M403A	COM	PUTFTCH	PUTS & FETCHES CHARACTERS
N103A	F4	LABRT	LOS ALAMOS ABORTER & MESSAGE PRINTER

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Q408A CCM     RWPPU      READ/WRITE BINARY PRU (PHYSICAL RECORD)
Q409A F4      ECSBUFD    DATA TRANSFER FROM ECS TO FILE & VICE VERSA
W113A CCM     OPEN       OPEN & CLOSE FILES
N103A F4      LABRT      LOS ALAMOS ABORTER & MESSAGE PRINTER
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635 SLACMON SLACMON, OPERATING AS A SYSTEM'S TASK OR JOB UNDER OS/360 MVT, IS DESIGNED TO MONITOR HARDWARE AND SOFTWARE PERFORMANCE OVER A GIVEN PERIOD OF TIME. INPUT TO SLACMON IS THE PARAMETER FIELD ON THE EXECUTE CARD COUPLED WITH THE CORRESPONDING OPERAND IN THE OPERATOR'S START COMMAND TO ALLOW SELECTED FUNCTIONS TO BE PERFORMED. FIVE DATA SETS OPTIONALLY PROVIDE NAMES OF QUEUES, I/O DEVICES, OR MODULES THAT SLACMON WILL MONITOR. OUTPUT CONSISTS OF UP TO 12 REPORTS FOLLOWED BY A SUMMARY PAGE; CERTAIN SUMMARY DATA MAY APPEAR ON THE CONSOLE DEVICE. THE OUTPUT IS MOST USEFUL FOR IDENTIFYING BOTTLENECKS AND INTERACTIONS, TUNING A SYSTEM FOR PEAK PERFORMANCE AND FOR INDICATING DESIRABLE HARDWARE AND SOFTWARE RECONFIGURATION.

640 DE/STEP,INTRP DE/STEP,INTRP PERFORMS THE SOLUTION OF AN INITIAL VALUE PROBLEM FOR A SYSTEM OF FIRST-ORDER ORDINARY DIFFERENTIAL EQUATIONS.

642 PROGLOOK PROGLOOK MAKES IT POSSIBLE TO MONITOR THE EXECUTION OF VIRTUALLY ANY OS/MVT, OS/MFT, OR VS2 RELEASE 1.6 LOAD MODULE. THE MAIN REASON FOR USING PROGLOOK IS TO FIND OUT WHICH PORTIONS OF A CODE USE MOST OF THE CPU TIME SO THAT THOSE PARTS OF THE PROGRAM CAN BE REWRITTEN TO REDUCE CPU TIME. FOR LARGE PRODUCTION PROGRAMS, USERS HAVE TYPICALLY FOUND IT POSSIBLE TO REDUCE CPU TIME BY 10 TO 30 PERCENT WITHOUT CHANGING THE PROGRAM'S FUNCTION.

644 GETCOR,FRECOR GETCOR AND FRECOR ARE ASSEMBLY LANGUAGE SUBROUTINES WHICH MAY BE CALLED FROM FORTRAN SUBROUTINES DURING EXECUTION TO ALLOCATE AND RELEASE CORE STORAGE. THOSE VARIABLES FOR WHICH CORE STORAGE IS TO BE ALLOCATED MUST BE PASSED AS ARGUMENTS OF THE FORTRAN SUBROUTINES. THESE PROGRAMS ALLOW VARIABLE DIMENSIONING IN SUBROUTINES WITHOUT A PREVIOUS SPECIFICATION OF THE MAXIMUM ALLOWABLE DIMENSIONS.

646 COPYCAT COPYCAT IS AN OS UTILITY PROGRAM DESIGNED TO PRODUCE AN EFFICIENT SYSTEM-WIDE CATALOG WHICH MAY RESIDE ON MANY VOLUMES. SUBSTANTIAL IMPROVEMENT IN PERFORMANCE MAY ALSO BE OBTAINED ON A SYSTEM WITH ONLY A SINGLE CATALOG. FIRST, CATALOG ENTRIES FROM MANY DIFFERENT CATALOGS MAY BE REDISTRIBUTED TO EQUALIZE THE LOAD ON EACH CATALOG. SECOND, EACH INDIVIDUAL CATALOG IS RESTRUCTURED IN A WAY DESIGNED TO MINIMIZE THE I/O TIME REQUIRED FOR SEARCHING AND UPDATING. REDISTRIBUTION AND RESTRUCTURING PARAMETERS ARE UNDER USER CONTROL. MODEL DSCB'S FOR GENERATION DATA GROUPS AND ALIAS ENTRIES ARE ALSO PROCESSED. CATALOGS ON ALL DIRECT ACCESS DEVICES, INCLUDING DATA CELLS, ARE SUPPORTED. BACKUP COPIES MAY ALSO BE MADE.

419 CASCADE/CLUSTER CASCADE IS A SIMULATION OF THE COLLISION CASCADE RESULTING FROM THE DISPLACEMENT OF A PRIMARY KNOCK-ON ATOM BY AN ENERGETIC NEUTRON IN A BODY-CENTERED-CUBIC OR FACE-CENTERED-CUBIC CRYSTAL STRUCTURE. CLUSTER ANALYZES THE SPATIAL DISTRIBUTION OF THE RESULTING RADIATION DAMAGE IN TERMS OF VACANCY AND INTERSTITIAL CLUSTERS, TAKING INTO ACCOUNT THE EXACT CRYSTAL STRUCTURE.

422 SPECTRA SPECTRA COMPUTES THE NUMBER AND SPECTRUM OF PRIMARY KNOCK-ON ATOMS RESULTING FROM NEUTRON COLLISION SEQUENCES IN A MATERIAL UNDER IRRADIATION.

566 RESPOND RESPOND CALCULATES THE RELATIVE ENERGY ABSORPTION OF A SMALL REGION OF ONE MATERIAL IN A LARGE BODY OF ANOTHER MATERIAL EXPOSED TO GAMMA- OR X-RADIATION.

609 INDX INDX PROVIDES A MEANS FOR RAPIDLY DEFINING AND TESTING TRIAL UNIT CELLS AS AN AID TO INDEXING POWDER PATTERNS OF CRYSTAL STRUCTURES OF UNKNOWN SYMMETRY.

619 ISOTAB ISOTAB COMPUTES POWER OUTPUT OF A SAMPLE OF MIXED ISOTOPES (PU238, PU239, PU240, PU241, PU242, AM241) AT ANY DESIRED DATE GIVEN THE MEASURED CALORIMETER VALUES, ISOTOPIC RATIOS AND CORRESPONDING DATES.

620 GROUP2 THIS PROGRAM CALCULATES THE SYMMETRY PROPERTIES OF LATTICE VIBRATIONS EITHER FOR ATOMIC CRYSTALS OR FOR EXTERNAL MODES OF MOLECULAR CRYSTALS AND GENERATES THE IRREDUCIBLE MULTIPLIER REPRESENTATIONS (IMR'S) INCLUDING THE EFFECTS OF TIME REVERSAL INVARIANCE (TRI) ON THE SYMMETRY COORDINATES.

527 HERMES THE HERMES MODEL CALCULATES THE REGIONAL RADIONUCLIDE RELEASES AND RADIATION DOSE TO THE POPULACE IN A GIVEN YEAR ARISING FROM THE OPERATION OF NUCLEAR FACILITIES TO MEET ELECTRICAL GENERATION DEMANDS WITHIN A GIVEN STUDY REGION.

591 PLETHS PLETHS IS A TIME-SHARING ISOPLETH-AREA PROGRAM FOR DETERMINING GROUND-LEVEL AREAS OF HIGH POLLUTANT CONCENTRATION DOWNWIND OF A SINGLE SOURCE OF EMISSION. THESE ELLIPTICAL AREAS ARE ENCLOSED BY ISOPLETHS OF CONSTANT CONCENTRATION PRODUCED BY CONTINUOUS POLLUTANT EMISSIONS FROM ONE SMOKE STACK OR GROUND SOURCE, OR FROM A CLOSELY ASSOCIATED GROUP OF SINGLE SOURCES. STACK HEIGHT, WEATHER CONDITIONS, AND SOURCE EMISSION RATE ARE TYPED IN AND THE PROGRAM CALCULATES AND DESCRIBES THE HIGH POLLUTION AREAS ENCLOSED BY ISOPLETHS.

599 TCPLYR2 TCPLYR2 APPLIES THE FIRST LAW OF THERMODYNAMICS TO COMPUTE THE TEMPERATURE OF A WATER MASS FLOWING IN AN OPEN CHANNEL. THE PROGRAM IS DESIGNED TO ACCOMMODATE VARIABLE DEPTH, VELOCITY, AND CROSS SECTION. THE SOURCE OF ENERGY (LOCATION OF THE DISCHARGE) IS ASSUMED TO BE SUFFICIENTLY DISTANT FROM THE RIVER SEGMENT UNDER EXAMINATION THAT THE MOMENTUM ASSOCIATED WITH THE DISCHARGE IS INSIGNIFICANT. VELOCITY DISTRIBUTION AT BOTH THE INLET AND OUTLET OF THE REACH AS WELL AS THE TEMPERATURE DISTRIBUTION AT THE INLET AS A FUNCTION OF TIME AND AT THE OUTLET INITIALLY ARE SPECIFIED. EDDY DIFFUSIVITIES, AMBIENT METEOROLOGICAL CONDITIONS, AND GEOMETRY ARE ALSO SUPPLIED TO THE CODE. ALTHOUGH THE LATERAL EDDY DIFFUSIVITY IS ALLOWED TO VARY SPATIALLY, THE EFFECT OF DENSITY DISPARITY IS NOT TREATED EXPLICITLY BY THE CODE. TEMPORAL BEHAVIOR INDUCED BY VARIATIONS IN THE AMBIENT METEOROLOGICAL AND BOUNDARY CONDITIONS ARE COMPUTED.

645 DYNAMIC ANALYSIS OF GASES THE PROGRAM PROCESSES MASS SPECTRAL DATA TO DETERMINE THE RATE AT WHICH GASES EVOLVE FROM A SOLID SAMPLE AND THE TOTAL QUANTITY OF GAS EVOLVED. CALIBRATION DATA AND MASS-PEAK MEASUREMENTS ARE DESCRIBED AS INPUT DATA. GAS FLOW RATE AND GAS QUANTITY ARE DESCRIBED AS OUTPUT DATA. IT IS USED FOR THE DYNAMIC ANALYSIS OF GASES BY FAST SCANNING MASS SPECTROMETRY. ALTHOUGH WRITTEN FOR DATA OBTAINED FROM A BENDIX MODEL 12-107 TIME-OF-FLIGHT (TOF) MASS SPECTROMETER, IT MAY BE APPLIED TO ANY TYPE OF MASS SPECTROMETER. THE BENDIX MASS SPECTROMETER IS USED TO CONTINUALLY MONITOR GASES EVOLVED DURING VACUUM BAKEOUT OF SOLID SAMPLES. THE TECHNIQUE IS USED TO DETERMINE SURFACE CONTAMINANTS ADSORBED AND TRAPPED GASES AND OTHER VOLATILE OUTGAS PRODUCTS.

577 FFEARS FFEARS IS GENERALLY APPLICABLE FOR THE SOLUTION OF BOUNDARY VALUE PROBLEMS INVOLVING THE LAPLACE EQUATION USING DIFFERENCE EQUATIONS IN AXISYMMETRIC OR RECTANGULAR COORDINATES. IT WILL HANDLE VIRTUALLY ANY CONFIGURATION OF DIELECTRICS AND FLOATING ELECTRODES, PRODUCING BOTH EQUIPOTENTIAL AND EQUIFIELD PLOTS, IF DESIRED.

574 MACS LATTICE VIBRATION CODES THIS PACKAGE OF SEVEN RELATED CODES IS BASICALLY AIMED AT GIVING MAXIMUM CAPABILITY FOR CALCULATING SLOW-NEUTRON SCATTERING BY MODERATORS.

MACS-C COMPUTES CRYSTAL VIBRATIONS WHEN THE POTENTIAL ENERGY IS A SUM OF PARTS ARISING FROM SHORT-RANGE FORCES AND LONG-RANGE COULOMB INTERACTIONS. IT ALSO OBTAINS JACOBIAN MATRICES FOR DETERMINING ADJUSTMENTS IN FORCE CONSTANTS AND IONIC CHARGE WHICH CAN LEAD TO IMPROVED AGREEMENT WITH DATA. STRUCTURE FACTORS FOR NEUTRON INELASTIC SCATTERING CAN ALSO BE CALCULATED.

MACS-J COMPUTES THE DYNAMICAL MATRIX FOR THE HARMONIC OSCILLATIONS OF A CRYSTAL, ITS EIGENVALUES AND EIGENVECTORS, THE CORRESPONDING STRUCTURE FACTORS FOR COHERENT SINGLE-PHONON SCATTERING OF NEUTRONS, AND JACOBIAN MATRICES FOR USE IN ADJUSTING FORCE CONSTANTS TO FIT CALCULATED TO OBSERVED DISPERSION CURVES.

REVISED-D CALCULATES VALANCE COORDINATES IN TERMS OF MASS ADJUSTED ATOM DISPLACEMENTS, TOGETHER WITH COORDINATES WHICH DEFINE RIGID GROUP ROTATIONS.

REVISED-MVFC CONSTRUCTS FORCE CONSTANT MATRICES FOR USE IN VALANCE FORCE POTENTIAL FUNCTIONS WHICH ARE USED IN OTHER PROGRAMS DEALING WITH MOLECULAR AND CRYSTAL VIBRATIONS.

ADJUSTER IS A FORCE ADJUSTER PROGRAM TO OBTAIN A LEAST SQUARES FIT TO OBSERVED FREQUENCIES OF MOLECULES AND CRYSTALS.

DIPOLE-SUM CALCULATES DIPOLE SUMS FOR AN ARBITRARY CRYSTAL.

MODEL-PI CALCULATES CRYSTAL VIBRATIONS WHEN THE POTENTIAL ENERGY IS A SUM OF SHORT-RANGE AND LONG- OR INTERMEDIATE-RANGE TERMS IN THE DIPOLE COORDINATE APPROXIMATION. IT ALSO OBTAINS JACOBIAN MATRICES FOR USE IN ADJUSTING INPUT PARAMETERS.

575 MSCAT IN A THERMAL NEUTRON SCATTERING EXPERIMENT, THE MEASURED CROSS SECTION INCLUDES BOTH SINGLE AND MULTIPLE SCATTERING EVENTS. IN ORDER TO EXTRACT THE SINGLE SCATTERING CROSS SECTION, THE CROSS SECTION FOR MULTIPLE SCATTERING MUST BE KNOWN. SINCE THIS CONTRIBUTION IS GENERALLY A SMOOTHER FUNCTION OF ANGLE AND SCATTERED ENERGY THAN THE SINGLE SCATTERING, IT IS LESS SENSITIVE TO DETAILS OF THE SINGLE SCATTERING CROSS SECTION. IT IS THEREFORE FEASIBLE TO CALCULATE THE MULTIPLE SCATTERING USING AN APPROXIMATE SCATTERING FUNCTION, AND TO SUBTRACT IT FROM THE MEASUREMENTS IN ORDER TO OBTAIN THE SINGLE SCATTERING. MSCAT CALCULATES THE SINGLE AND MULTIPLE SCATTERING CROSS SECTIONS, FOR A SPECIFIED EXPERIMENTAL SITUATION, GIVEN A SINGLE SCATTERING FUNCTION AS INPUT.

622 GAUSS6 GAUSS6 IS USED FOR THE PRODUCTION ANALYSIS OF GAMMA-RAY SPECTRA OBTAINED WITH A GE(LI) DETECTOR AND A MULTICHANNEL PULSE-HEIGHT ANALYZER SYSTEM. IN ADDITION TO DETERMINING GAMMA-RAY ENERGIES AND INTENSITIES, IT PROVIDES ISOTOPIC IDENTIFICATION, DECAY CORRECTIONS AND CORRELATION OF DATA FROM DIFFERENT PEAKS AND DIFFERENT SPECTRA TO OBTAIN ISOTOPIC DECAY RATES.

632 MMM3 MMM3 COMPUTES THE EIGENVALUES (FREQUENCIES) AND EIGENVECTORS (NORMAL MODES) FOR A SEMI-RIGID MOLECULE, AND COMPUTES THE TRANSFORMATION MATRIX FOR EXPRESSING THE CARTESIAN DISPLACEMENTS OF THE ATOMS IN TERMS OF THE NORMAL COORDINATES. COMPUTATION OF THE EFFECTIVE ATOMIC MASSES AND MEAN-SQUARED AMPLITUDES OF VIBRATION FOR USE IN SLOW NEUTRON SCATTERING CALCULATIONS IS INCLUDED AS WELL.

561 TOKMINA/TOKMINA2 TOKMINA FINDS THE MINIMUM MAGNETIC FIELD, BM, REQUIRED AT THE TOROIDAL COIL OF A TOKAMAK TYPE FUSION REACTOR WHEN THE INPUT IS BETA(RATIO OF PLASMA PRESSURE TO MAGNETIC PRESSURE), Q(KRUSKAL-SHAFRANOV PLASMA STABILITY FACTOR), AND Y(RATIO OF PLASMA RADIUS TO VACUUM WALL RADIUS: RP/RW) AND ARRAYS OF PT(TOTAL THERMAL POWER FROM BOTH D-T AND TRITIUM BREEDING REACTIONS), PW(WALL LOADING OR POWER FLUX) AND TB(THICKNESS OF BLANKET), FOLLOWING THE METHOD OF GOLOVIN, ET AL. TOKMINA2 FINDS THE TOTAL POWER, PT, OF SUCH A FUSION REACTOR, GIVEN A SPECIFIED MAGNETIC FIELD, BM, AT THE TOROIDAL COIL.

627 TOODY2 TOODY2 IS USED TO COMPUTE WAVE PROPAGATION IN TWO DIMENSIONS IN RECTANGULAR OR CYLINDRICAL COORDINATES.

356 GAF/GAR DATA TAPES USED IN GGA A BENCHMARK STUDY OF ZPR-III ASSEMBLY 48 USING ENDF/B CROSS SECTIONS WAS UNDERTAKEN TO IDENTIFY POSSIBLE CROSS SECTION DISCREPANCIES IN THE MICROSCOPIC ENDF/B DATA. THIS WORK WAS DONE FOR THE CSEWG TESTING SUBCOMMITTEE AS PART OF THEIR PHASE I DATA TESTING. THIS PACKAGE CONTAINS THE CROSS SECTION DATA GENERATED FOR THIS STUDY IN THE FORM OF THE ULTRA-FINE GROUP CROSS SECTIONS OF THE MATERIALS OF ZPR-III ASSEMBLY 48 IN THE FORMAT OF THE GGA GAF/GAR PROGRAM DATA TAPES.

447 ETOG1 DATA FOR MUFT AND GAM THE DATA REQUIRED FOR THE CREATION OF MUFT4, MUFT5, GAM1 AND GAM2 LIBRARIES WERE GENERATED FROM THE BROOKHAVEN NATIONAL NEUTRON CROSS SECTION CENTER ENDF/B TAPES 114 THROUGH 117 BY THE ETOG1 PROGRAM (ACC ABSTRACT 437).

532 LOS ALAMOS GROUP-AVERAGED CROS GROUP CONSTANTS AND COMPUTED NEUTRON CROSS SECTIONS ARE TABULATED FOR A VARIETY OF MATERIALS INCLUDING - AL, B, BE, C, CD, CL, D, GA, F194, FE, H, K, LI6, MO, NA, NI, O, PU239, PU240, PU249, TH, U233, U235, U238, AND ZR. THESE ARE PRESENTED AS 18-, 24-, AND 25-GROUP CALCULATIONS FOR REACTORS WITH NEUTRON ENERGIES RANGING FROM FAST TO THERMAL.

543 ENDF/B-THERMOS THESE DATA ARE 30-GROUP THERMOS THERMAL SCATTERING KERNELS FOR P0 TO P5 LEGENDRE ORDERS FOR EVERY TEMPERATURE OF EVERY MATERIAL FROM S(ALPHA,BETA) DATA STORED IN THE ENDF/B LIBRARY. THESE SCATTERING KERNELS WERE GENERATED USING THE FLANGE2 COMPUTER CODE (ACC ABSTRACT 368). TO TEST THE KERNELS, THE INTEGRAL PROPERTIES OF EACH SET OF KERNELS WERE DETERMINED BY A PRECISION INTEGRATION OF THE DIFFUSION LENGTH EQUATION AND COMPARED TO EXPERIMENTAL MEASUREMENTS OF THESE PROPERTIES. IN GENERAL, THE AGREEMENT WAS VERY GOOD. DETAILS OF THE METHODS USED AND RESULTS OBTAINED ARE CONTAINED IN THE REFERENCE. THE SCATTERING KERNELS ARE ORGANIZED INTO A TWO VOLUME MAGNETIC TAPE LIBRARY FROM WHICH THEY MAY BE RETRIEVED EASILY FOR USE IN ANY 30-GROUP THERMOS LIBRARY. THE CONTENTS OF THE TAPES ARE AS FOLLOWS -

VOLUME I

MATERIAL	ZA	TEMPERATURES (DEGREES K)
MOLECULAR H2O	100.0	296, 350, 400, 450, 500, 600, 800, 1000
MOLECULAR D2O	101.0	296, 350, 400, 450, 500, 600, 800, 1000
GRAPHITE	6000.0	296, 400, 500, 600, 700, 800, 1000, 1200, 1600, 2000
POLYETHYLENE	205.0	296, 350
BENZENE	106.0	296, 350, 400, 450, 500, 600, 800, 1000

VOLUME II

MATERIAL	ZA	TEMPERATURES (DEGREES K)
ZR BOUND IN ZRHX	203.0	296, 400, 500, 600, 700, 800, 1000, 1200
H BOUND IN ZRHX	230.0	296, 400, 500, 600, 700, 800, 1000, 1200
BERYLLIUM-9	4009.0	296, 400, 500, 600, 700, 800, 1000, 1200
BERYLLIUM OXIDE	200.0	296, 400, 500, 600, 700, 800, 1000, 1200
URANIUM DIOXIDE	207.0	296, 400, 500, 600, 700, 800, 1000, 1200

637 GAMTAB THIS PACKAGE CONTAINS A TWO-PART CATALOG OF GAMMA RAYS EMITTED BY NUCLIDES IN RADIOACTIVE DECAY AND A LIST OF CORRESPONDING REFERENCES. THE FIRST PART LISTS THE GAMMA RAYS IN ORDER OF ASCENDING ENERGY. THIS LISTING CONSISTS OF GAMMA-RAY ENERGY AND UNCERTAINTY, ABUNDANCE, HALF-LIFE, PRODUCTION MODE, AND THE ENERGIES OF TWO OF THE MORE ABUNDANT ASSOCIATED GAMMA RAYS. THE SECOND PART OF THE CATALOG LISTS UP TO 50 OF THE MORE ABUNDANT GAMMA RAYS FOR EACH NUCLIDE. THE LISTING FOR EACH NUCLIDE INCLUDES HALF-LIFE, PRODUCTION MODE, POSSIBLE GENETIC RELATIONSHIPS, AND REFERENCES. THIS LISTING IS FOLLOWED BY THE ENERGY, UNCERTAINTY IN ENERGY, AND ABUNDANCE OF EACH GAMMA RAY. REFERENCES AVAILABLE THROUGH MAY 1973 CORRESPONDING TO THE REFERENCE KEYS LISTED FOR EACH NUCLIDE IN PART 2 ARE LISTED AS THE THIRD FILE.

VII. KWIC INDEX

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A-E  ANL   360  F+P+A RS      T P $ AMDLIBAE, ARGONNE SUBROUTINE LIBRARY CAT.    562
AAEC  360  F+BAL RS P   T C $ CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM       103
ABSORPTION REMOVAL X-SECS BAPL 6600  F4     RS      T B $ MC807, 2-D DIFFUSION   280
ABSORPTION, CELL   ANL  3600  F36   RSBP X T B $ RABBLE,WLIB,FLAT, RESONANCE     281
ACCIDENT ANALYSIS       BAPL 6600  F4     RS P   T G $ FLASH3, LOSS-OF-COOLANT    295
ACCIDENT ANALYSIS   NED   635  F4     RS P   T G $ FREADM1, FAST REACTOR CORE     479
ACCIDENT ANALYSIS  BAPL 6600  F4     RS P   T G $ MO555,ACT1, LOSS-OF-COOLANT    284
ACCIDENT ANALYSIS DOSE CALC GGA  1108  F4     RS      T G $ GADOSE,DOSET, HTGR    261
ACTIVITY DIST STUDY GGA  7044  F4     RS P     D $ RAD2, HTGR FISSION PRODUCT    231
ACTIVITY RELATION  GEC   635  F4     RSBP     D $ DOS, NEUTRON FLUX-DOSIMETER   423
ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS  BAPL 6600  F4     RS P   T G $ MO555,   284
ADEP, 1D AND 2D FEW-GROUP SPACE-TIME KINETICS  BCL  6400  F4     RS P   T F $    494
ADLER, ENDF/B RESONANCE XSECTION CODES  BNL  6600B F4     RS P   T A $ RESEND,   465
AEB   360  F4     RS  L   T C $ FIRE5, 1-D AGE-DIFFUSION SLAB CYLINDER SPHERE      9
AEB   360  F4     RS P     B $ WELWING, MATERIAL BUCKLING CYL FUEL ELEMENTS       362
AEB   360  F4     RS P     E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK      121
AEB   360  F4     RS P     E $ BLAST, REACTOR KINETICS TEMPERATURE DIST STUDY     363
AEC DP PURCHASE VERSUS LEASE ANALYSIS   SLA   360  COBCL RSBP  CT M $ BECOM,      589
AEC DP PURCHASE VERSUS LEASE ANALYSIS   SLA  1108  COBCL RS P     M $ BECOM,      589
AEC-ALO FAU, RADIO FREQUENCY MANAGEMENT SYSTEM ALOO  360  COBOL RS P     M $     587
AEG  7090  F2     RS       B $ DANCOFF JR, MODERATOR SPACE CHORD DIST FUNCT       150
AERI 6600         RSBPLX T B $ LEOPARD, SPECTRA CALCULATION WITH DEPLETION       279
AEROSOL PARTICLE TRANSPORT STUDY        RFD  3600  F36   RS P     G $ DISPER,    554
AEROSOLS    AI    360  F4     RS P   T G $ HAA3, COAGULATION OF HETEROGENEOUS     443
AGC  7090  F+FAP RSBPLX T B $ AGN-GAM, FAST SPECTRUM MULTI-GP CONSTANT CALC      204
AGC  7090  FLCCO RSBP     C $ 2DXY, 2-D MULTI-GP SN APPROXIMATION XY GEOM         18
AGC  7090  F2     RS P     B $ BOUNCE, FLUX DIST IN MULTI-PIN FUEL ELEMENT        237
AGC  7090  F2     RS P     O $ CROC90, ML-1 FLUID FLOW EXPERIMENT ANALYSIS        154
AGC  7090  F2     RS P   T B $ AGN-SIGMA, CALC OF MULTI-GP TRANSFER MATRICES      243
AGC  7090  F2     RSB      F $ HATCHET, COUPLED NEUTRONICS-HYDRODYNAMICS CODE     153
AGE CALCULATION OF ENDF/B DATA  BAPL 6600  F4     RS P   T E $ EPOCH, NEUTRON     461
AGE-DIFFUSION SLAB CYLINDER SPHERE  AEB   360  F4     RS  L   T C $ FIRE5, 1-D      9
AGN-GAM, FAST SPECTRUM MULTI-GP CONSTANT CALC  AGC  7090  F+FAP RSBPLX T B $      204
AGN-SIGMA, CALC OF MULTI-GP TRANSFER MATRICES  AGC  7090  F2     RS P   T B $      243
AI    360  F+BAL RS      T P $ FIGS, IBM36062250 FORTRAN GRAPHICS SUBROUTINES    484
AI    360  F+BAL RS P   T A $ COMNUC,CASCADE, COMPOUND NUCLEUS REACTION            482
AI    360  F+BAL RS P   T E $ AIROS2A, SIMULATION OF REACTOR DYNAMICS              326
AI    360  F+BAL RS P  CT B $ U3R, UNRESOL RESONANCE X$EC PROBABILITY TABLES       553
AI    360  F+BAL RS P X T B $ HWCCR-SAFE, 2-D MONTE CARLO CELL CALCULATION         307
AI    360  F+BAL RSB L CT M $ SCORE3, SCISRS ENDF/B GRAPHIC X-SEC EVALUATION      375
AI    360  F4     RS P   T F $ TSN, SPATIALLY-DEPENDENT REACTOR KINETICS          309
AI    360  F4     RS P   T G $ AISITE2, PARAMETRIC SITE REQUIREMENT STUDY         172
AI    360  F4     RS P   T G $ HAA3, COAGULATION OF HETEROGENEOUS AEROSOLS         443
AI    360  F4     RS P   T G $ SOFIRE2, SODIUM POOL FIRE 1- & 2-CELL ANALYSIS     559
AI    360  F4     RS P   T Q $ RESPOND, DISSIMILAR MEDIA TLD CORRECTION CALC      566
AI    360  F4     RS P  CT I $ PSA2, STRESS ANALYSIS MULTIANCHOR PIPE SYSTEM      542
AI    360  F4     RS PLX T B $ AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES     147
AI    360  F4     RSB L   T M $ CLIP, FORM OR THREDES LIBRARY UTILITY ROUTINE     271
AI    360  F4     RSBP    T K $ THREDES, 1-D FEW-GP DIFFUSION DESIGN SYSTEM       273
AI    360  F4     RSBP X T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION          58
AI    360  F4     RSBPLX T C $ ANISN, 1-D MULTI-GP DISCRETE ORDINATE CALC         151
AI    360  F4     RSBPLX T C $ CAESAR4,LIBLST, 1-D MULTI-GP DIFFUSION + LIB       270
AI   7090  F+FAP RS      T I $ 4RESTRAINT PIPE STRESS, MAXIMUM MOMENT CALC       109
AI   7090  F+FAP RS  L   T B $ QUICKIE, INFINITE MEDIUM SPECTRUM X-SECTIONS       119
AI   7090  F+FAP RS  L   T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE       120
AI   7090  F+FAP RS  L   T C $ ULCER, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE      118
AI   7090  F+FAP RS PL   T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS       50
AI   7090  F+FAP RS PL   T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE        29
AI   7090  F2     RS       B $ S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION         53
AI   7090  F2     RS       C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES        30
AI   7090  F2     RS       E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK      121
AI   7090  F2     RS       E $ SNAPKIN5/5A, 1-REGION KINETICS SNAP GEOMETRY       122
AI   7090  F2     RS       I $ CROCK, SPACE POWER PLANT DESIGN OPTIMIZATION       112
AI   7090  F2     RS       1 $ FUGUE, STEADY-STATE TEMPERATURE VOID FRACTION       48
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AI   7090  F2    RS        I $ SHOCK, SPACE POWER PLANT DESIGN OPTIMIZATION          114
AI   7090  F2    RS        J $ FARSE1A, DOSE RATE FROM SNAP SHIELD LEAKAGE            91
AI   7090  F2    RS        J $ MORTIMER, DOSE RATE CALCULATION SNAP GEOMETRY         142
AI   7090  F2    RS        J $ SCARF2, SCATTER FROM RADIATOR FINS SNAP GEOM          110
AI   7090  F2    RS        J $ SCAR1, SCATTER FROM A RING SNAP GEOMETRY              111
AI   7090  F2    RS  L   T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION             58
AI   7090  F2    RS P      B $ BAM, S4 CYL CELL CODE AND TEMPEST COMBINATION         108
AI   7090  F2    RS P      B $ SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY          52
AI   7090  F2    RS P      D $ AIMFIRE, URANIUM FUEL CYCLE COST ANALYSIS              55
AI   7090  F2    RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD                47
AI   7090  F2    RS P      J $ GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY            45
AI   7090  F2    RS P      J $ GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM          46
AI   7090  F2    RS P      J $ RATRAP, DOSE RATE CALCULATION SNAP GEOMETRY           141
AI   7090  F2    RS P    T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE         28
AI   7090  F2    RS PL   T A $ ARES2, RESONANCE INTEGRAL X-SECTION CALC               89
AI   7090  F2    RS PL   T B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC            51
AI   7090  F2    RS PLX T C $ DTF2, 1-D MULTI-GP DISCRETE ORDINATE CALC             151
AI   7094  F+FAP RS  L   T M $ MOMUS, X-SECTION LIBRARY UTILITY PROGRAM             159
AI   7094  F+FAP RS P      J $ SHOE, SHIELD WEIGHT OPTIMIZATION DOSE CALC            197
AI   7094  F+FAP RS P    T G $ AISITE2, PARAMETRIC SITE REQUIREMENT STUDY            172
AI   7094  F+FAP RS P    T H $ HEATING2, TRANSIENT STEADY-STATE HEAT TRANSFER        198
AI   7094  F+FAP RS PL   T B $ AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES        147
AI   7094  F+FAP RS PL   T B $ GRAVE, GROUP-AVERAGING X-SECTIONS PARAMETERS          162
AI   7094  F+FAP RS PL   T B $ TYCHE3, MONTE CARLO SLOWING-DOWN DENSITY CALC         149
AI   7094  F+FAP RS PL   T G $ CURIE,DOSE,THUNDERHEAD, EXTERNAL+INTERNAL DOSE        196
AI   7094  F+MAP RS P      A $ CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST DATA        215
AI   7094  F+MAP RS P    T E $ AIROS, SPACE-INDEPENDENT KINETICS W/FEEDBACK          163
AI   7094  F+MAP RS P    T F $ TSN, SPATIALLY-DEPENDENT REACTOR KINETICS             309
AI   7094  F+MAP RS PLX T A $ TRIX1, RESONANCE INTEGRAL X-SECTION CALC               208
AI   7094  F2    RS P      H $ FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW            246
AI   7094  F2    RS P    T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS         254
AI   7094  F2    RS P    T G $ TRANS-FUGUE1, TRANSIENT FLOW AND HEAT TRANSFER        268
AI   7094  F2    RS PL   T I $ CYCLOPS1, THERMODYNAMIC CYCLE ANALYSIS                 244
AI   7600  F4    RS PLX T C $ VIM1, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS            510
AI-A  360  F4    RSBPL CT C $ VIM1X, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS          510
AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES AI    360  F4    RS PLX T B $        147
AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES AI   7094  F+FAP RS PL  T B $        147
AIM AND FOG CODES   AI   7090  F2    RS        C $ PERT, 1-D PERTURBATION FOR        30
AIM AND FOG CODES   BHSC  360  F4    RS P      C $ PERT, 1-D PERTURBATION FOR        30
AIM AND FOG CODES   CDC  1604  F63   RS        C $ PERT, 1-D PERTURBATION FOR        30
AIMFIRE, URANIUM FUEL CYCLE COST ANALYSIS       AI   7090  F2    RS P      D $        55
AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    AI   7090  F+FAP RS PL  T C $        29
AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    CDC  1604  F63   RS PL  T C $        29
AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    CSUC  370  F4    RS PL CT C $        29
AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK   AEB   360  F4    RS P      E $       121
AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK   AI   7090  F2    RS        E $       121
AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK   CDC  1604  F63   RS P      E $       121
AIROS, SPACE-INDEPENDENT KINETICS W/FEEDBACK    AI   7094  F+MAP RS P    T E $       163
AIROS2A, SIMULATION OF REACTOR DYNAMICS         AI    360  F+BAL RS P    T E $       326
AISITE2, PARAMETRIC SITE REQUIREMENT STUDY      AI    360  F4    RS P    T G $       172
AISITE2, PARAMETRIC SITE REQUIREMENT STUDY      AI   7094  F+FAP RS P    T G $       172
ALAMOS SUBROUTINE LIBRARY ROUTINES LASL 6600B F+COM RS      T P $ LASLIB, LOS        633
ALGEBRAIC EQN SOLN CURVE PLOT   KAPL 6600  F+ASC RS P    T P $ SNEQ, NONLINEAR       364
ALLOC   ORNL  360  BAL+F RS P   CT P $ GETCOR,FRECOR, FORTRAN DYNAMIC STORAGE         644
ALLOCATION PROJECT PLANNING MLMC  360  F+C+R RSBP   T M $ RALCRTPH, RESOURCE         603
ALOO  360  COBOL RS P      M $ AEC-ALO FAU, RADIO FREQUENCY MANAGEMENT SYSTEM        587
ALPHA-M, RESOLUTION OF GAMMA RAY SPECTRA        ORNL  360  F4    RS P      O $       413
AMDLIBAE, ARGONNE SUBROUTINE LIBRARY CAT. A-E   ANL   360  F+P+A RS      T P $       562
AMDLIBF, ARGONNE SUBROUTINE LIBRARY CAT. F      ANL   360  F+BAL RS      T P $       563
AMDLIBGZ, ARGONNE SUBROUTINE LIBRARY CAT. G-Z   ANL   360  F+P+A RS      T P $       564
ANALYSES SEMI-RIGID MOLECULES ANC   360  F4    RS P      W $ MMM3, COORDINATE        632
ANALYZER GAMMA-RAY SPECTRA GGA  1108  F+BAL RS P    T O $ TCAD, PROCESSING OF         333
ANC   360  BAL   RSB     T P $ NRTS-RJE, OS/360 MVT REMOTE JOB ENTRY SYSTEM           519
ANC   360  F+BAL RS      T P $ NRTS ENVIRONMENTAL ROUTINES, FORTRAN UTILITIES        613
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ANC    360   F+BAL RSBPL CT G $ PARET, WATER-COOLED CORE TRANSIENT ANALYSIS        55
ANC    360   F+P+A RSBP XCT W $ GAUSS6, BATCH ANALYSIS OF GAMMA-RAY SPECTRA        62
ANC    360   F4    RS P     W $ MMM3, COORDINATE ANALYSES SEMI-RIGID MOLECULES    63
ANC    360   F4    RS P   T H $ ASTEM, THERMODYNAMIC PROPERTIES WATER & STEAM      58
ANC    360   F4    RS P   CT W $ MACS LATTICE VIBRATION NEUTRON SCATTRING CODES    57
ANC    360   F4    RS PL  CT B $ INCITE, THERMAL SPECTRA & MULTI-GP CONSTANTS      56
ANC    360   F4    RS PL  CT M $ ERREST, LOCA ROD BUNDLE CHF DATA ANALYSIS         51
ANC    360   F4    RS PLXCT B $ PHROG, MULTI-GP CONSTANT & FAST SPECTRA CALC       52
ANC    360   F4    RSBP   CT C $ MONA, 1-D MULTIGROUP DIFFUSION SLAB, CYL, SPH     58
ANC    360   F4    RSBP   CT D $ DWARF, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM     57
ANC    360   F4    RSBP   CT G $ PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES     52
ANC    360   F4    RSBP   CT G $ RSAC, RADIOLOGICAL SAFETY ANALYSIS PROGRAM        26
ANC    360   F4    RSBP   CT I $ FPFM, STEADY-STATE FISSION PRODUCT FUEL MODEL     58
ANC    360   F4    RSBP   CT I $ STRAP, STATIC & DYNAMIC STRUCTURAL ANALYSIS       53
ANC    360   F4    RSBP   CT J $ VIEWPIN, VIEW FACTOR CALC FOR CYLINDRICAL PINS    56
ANC    360   F4    RSBP X T G $ THETA1-B, FUEL ROD THERMAL RESPONSE LOCA           51
ANC    360   F4    RSBP XCT G $ RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS      36
ANC    360   F4    RSBP XCT H $ MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC          55
ANC    360   F4    RSBP XCT W $ GAUSS5, ANALYSIS OF GAMMA-RAY SPECTRA GE(LI)       60
ANC    360   F4    RSBPL CT C $ RAFFLE-ANC, MONTE CARLO NEUTRON TRANSPORT CODE     63
ANC    360   PL1   RS P   T P $ PTAC11, 2-PASS ASSEMBLER FOR THE PDP-11 ON 360     51
ANC    360B F+BAL RSBP   CT G $ CONTEMPT-LT/022, PRESSURE-TEMPERATURE RESPONSE     43
ANC    360C F+BAL RSBPLXCT G $ RELAP4, TRANSIENT THERMAL-HYDRAULIC ANALYSIS        36
ANC    360F F+BAL RS P XCT D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION         27
ANC   1108   F4    RS P   T G $ PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES      52
ANC   1108   F4    RS P   T G $ RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS      36
ANC   1108   F4    RS P   T H $ MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC          55
ANC   6600   F4    RS P   T G $ RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS      36
ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE ANL   360  F4    RS P   T E $      48
ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE LASL 6600  F4    RS P   T E $      48
ANGULAR DIST  GGA  7044  F4    RS P X   A $ LEGCOEF3, LEGENDRE COEF CALC FOR      21
ANGULAR DIST DATA AI   7094  F+MAP RS P     A $ CHAD, LEGENDRE COEF CALC FOR       21
ANGULAR DISTRIBUTION LEGENDRE FITTING    KAPL 6600  F4    RS P     A $ CLEM,      53
ANISN X-SEC FORMAT WAPD 6600  F4    RS PL  T B $ ETOG1, ENDF/B TO MUFT, GAM,       43
ANISN X-SEC FORMAT WAPD 7600  F4    RS P   T B $ ETOG3, ENDF/B TO MUFT, GAM,       53
ANISN, 1-D MULTI-GP DISCRETE ORDINATE CALC     AI    360  F4    RSBPLX T C $       15
ANL    360   F+ASM RSB   CT P $ WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG       54
ANL    360   F+BAL R B L  T P $ TSO-SPEAKEASY, LANGUAGE PROCESSOR UNDER TSO        59
ANL    360   F+BAL RS     T P $ AMDLIBF, ARGONNE SUBROUTINE LIBRARY CAT. F         56
ANL    360   F+BAL RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM       20
ANL    360   F+BAL RS P   CT M $ ARC-SYSTEM, SYSTEM SUBPROGRAMS AND MODULES        52
ANL    360   F+BAL RSBPL CT D $ REBUS2, FUEL CYCLE ANALYSIS FOR FAST REACTORS      63
ANL    360   F+P+A RS     T P $ AMDLIBAE, ARGONNE SUBROUTINE LIBRARY CAT. A-E     56
ANL    360   F+P+A RS     T P $ AMDLIBGZ, ARGONNE SUBROUTINE LIBRARY CAT. G-Z     56
ANL    360   F4    RS       M $ MERMC2, MC**2 BINARY LIBRARY TAPE MAINTENANCE     47
ANL    360   F4    RS     T M $ RIGEL, ENDF/B V3 DATA PROCESSING CODE             57
ANL    360   F4    RS P     D $ NPRFCCP, FUEL CYCLE COSTS PERFORMANCE DATA        14
ANL    360   F4    RS P     E $ R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS      25
ANL    360   F4    RS P     E $ R102, SPACE-INDEPENDENT INVERSE KINETICS CALC     16
ANL    360   F4    RS P     F $ TWIGGLE, 2-D 2-GP SPACE-TIME DIFFUSION            33
ANL    360   F4    RS P     G $ SCCOOL2, SODIUM-FUEL INTERACTION ANALYSIS         52
ANL    360   F4    RS P     O $ DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION      46
ANL    360   F4    RS P     X $ TOKMINA/TOKMINA2, TOKAMAK FUSION REACTOR STUDY    56
ANL    360   F4    RS P   T B $ CLUP77, SQUARE CELL COLLISION PROBABILITY CALC    52
ANL    360   F4    RS P   T E $ ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE    48
ANL    360   F4    RS P   T F $ SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS     40
ANL    360   F4    RS P   T I $ LIFE1, FAST REACTOR FUEL ELEMENT BEHAVIOR         46
ANL    360   F4    RS P   T M $ CRECT,CHECKER, ENDF/B V2 PROCESSING CODES         47
ANL    360   F4    RS P   T N $ PLOT-3D, 3-D PLOTS ON IBM2280 OR CALCOMP780       54
ANL    360   F4    RS P   T Q $ GROUP2, GROUP THEORY OF LATTICE DYNAMICS          62
ANL    360   F4    RS P   CT B $ MC**2, ENDF MULTIGROUP X-SECTION CALCULATION     35
ANL    360   F4    RS P   CT D $ 3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS    56
ANL    360   F4    RS P   CT F $ REXCO-H, 2-D HYDRODYNAM RESPONSE TO EXCURSION    55
ANL    360   F4    RS P   CT F $ REXCO-H2, 2-D HYDRODYNAM RESPONSE TO EXCURSION   61
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ANL   360  F4     RS P   CT M $ ETOE, ENDF/B TO MC**2 DATA CONVERSION                350
ANL   360  F4     RS P   CT W $ MSCAT, SLOW NEUTRON MULTIPLE SCATTERING CALC         575
ANL   360  F4     RS P X T F $ FORF2, FAST REACTOR EXCURSION CALCULATIONS            174
ANL   360  F4     RS P X T P $ FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....       610
ANL   360  F4     RS P XCT F $ VENUS, 2-D LMFBR POWER EXCURSION DISASSEMBLY          511
ANL   360  F4     RS PL CT F $ QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE        474
ANL   360  F4     RSB  XCT P $ EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE        534
ANL   360  F4     RSBP   CT C $ ARC-DIF1D, 1-D MULTI-GP DIFFUSION & INVENTORY        626
ANL   360  F4     RSBP   CT L $ ARC-NUI002, BCD INPUT DATA PROCESSING MODULE         533
ANL   360  F4     RSBPL CT C $ VARI-1D, 1-D VARIATIONAL SENSITIVITY                  625
ANL   360  F4     RSBPL CT L $ ARC-XSEC1, MICROSCOPIC X-SECTION MANIPULATION         594
ANL   360B BAL    RSB  X T P $ COPYCAT, IBM OS SYSTEM CATALOG UTILITY ROUTINE        646
ANL   360B F+ASM  RSB   CT P $ WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG          541
ANL   360B F4     RS P     I $ NUROW, STRUCTURAL ANALYSIS BOWED REACTOR CORES        643
ANL   360B F4     RS P   C P $ GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER         592
ANL   360B F4     RS P   CT I $ SAF4, STRUCTURAL ANALYSIS OF LINEAR SYSTEMS          641
ANL   635  F4     RS   X T P $ EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE        534
ANL  GETS  F      R        R $ PLETHS, ISOPLETH-AREA CALC FROM SINGLE SOURCE        591
ANL  1108  F4     RS   X T P $ EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE        534
ANL  1108  F5     RS P X T P $ FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....       610
ANL  1604  F63    RS P     H $ MC899,HOH, STEAM TABLES 14.5-2538 PSIA               294
ANL  3600  F36     SPP     I $ BOW2, DEFLECTION CALCULATION PARALLEL BEAMS          365
ANL  3600  F36    RS P   T B $ MC**2, ENDF MULTIGROUP X-SECTION CALCULATION          355
ANL  3600  F36    RS P   T C $ SNARG-1D, 1-D MULTI-GP DISCRETE ORDINATE CALC         288
ANL  3600  F36    RS P   T I $ SUPORAN, REACTOR CORE SUPPORT STRESS ANALYSIS         357
ANL  3600  F36    RS P X T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE         262
ANL  3600  F36    RS P XCT C $ TESS, 1-D SLAB AND SPHERE GEOM SN TRANSPORT           513
ANL  3600  F36    RSBP     A $ MISH-MASH, RESONANCE INTEGRAL CALC HOMOGENEOUS       214
ANL  3600  F36    RSBP     G $ CHEMLCC2, CORE HEATING CLADDING-STEAM REACTION       366
ANL  3600  F36    RSBP     I $ SWELL2, FUEL ELEMENT LIFETIME ANALYSIS               353
ANL  3600  F36    RSBP X T B $ RABBLE,WLIB,FLAT, RESONANCE ABSORPTION, CELL         281
ANL  3600  F36    RSBP X T B $ RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG CELL        213
ANL  3600  F4     RSBP   T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION          325
ANL  3600  F63    RS  LX T B $ GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC            33
ANL  3600  F63    RSBP     A $ NEARREX, COMPOUND NUCLEUS X-SECTION CALC             171
ANL  3600  F63    RSBP     E $ R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS         255
ANL  3600  F63    RSBP     E $ R102, SPACE-INDEPENDENT INVERSE KINETICS CALC        168
ANL  3600  F63    RSBP     C $ COINC, COINCIDENCE COUNTING DATA REDUCTION           248
ANL  3600  F63    RSBP   T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS        254
ANL  3600  F63    RSBP   T E $ TRAFICORPORATION, TRANSFER FUNCTION SYNTHESIS        135
ANL  3600  F63    RSBP   T G $ R153, PARAMETRIC SITE REQUIREMENT STUDY              172
ANL  3600  F63    RSBP   T H $ ARGUS, TRANSIENT TEMPERATURE CALC CYLINDER           152
ANL  3600  F63    RSBP   T M $ XLIBIT, X-SECTION LIBRARY UTILITY ROUTINE            181
ANL  3600  F63    RSBP XCT B $ THERMOS(ANL), THERMAL SPECTRUM X-SECTION CALC        184
ANL  3600  F63    RSBPL  T J $ MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY          143
ANL  3600  36F    RS PL CT F $ QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE        474
ANL  3600  36F    RSBP   T M $ MERMC2,MAGIC, MC**2 LIBRARY SERVICE ROUTINES          472
ANL  6600  F4     RS   X T P $ EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE        534
ANL  6600  F4     RS P   T F $ SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS         400
ANL  6600  F4     RS P X T P $ FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....       610
ANL), THERMAL SPECTRUM X-SECTION CALC  ANL  3600  F63   RSBP XCT B $ THERMOS(       184
ANNULAR VOID X-SECTION CALCULATION     GEC   625  F4    RS P     B $ AVOID,         276
ANVENT, LOCA ANALYSIS DUKE POWER MCGUIRE UNITS DUCO  635  F4    RS        G $        529
APDA 3600  ASAF4 RS P   T M $ ETOE, ENDF/B TO MC**2 DATA CONVERSION                350
APDA 7094  F2    RS P     F $ WEAK EXPLOSION, COUPLED NEUTRON-HYDRODYNAMICS         145
APDA 7094  F4    RS P     F $ MARS, 2-D EXCURSION CALCULATION R-Z GEOMETRY          293
APRF 6600  F4    RS       B $ APRFX1, 99-GP DLC-2B LIBRARY GROUP COLLAPSING         466
APRFX1, 99-GP DLC-2B LIBRARY GROUP COLLAPSING  APRF 6600  F4    RS        B $       466
ARC-DIF1D, 1-D MULTI-GP DIFFUSION & INVENTORY  ANL   360  F4    RSBP   CT C $        626
ARC-NUI002, BCD INPUT DATA PROCESSING MODULE   ANL   360  F4    RSBP   CT L $        533
ARC-SYSTEM, SYSTEM SUBPROGRAMS AND MODULES     ANL   360  F4+BAL RS P  CT M $        522
ARC-XSEC1, MICROSCOPIC X-SECTION MANIPULATION  ANL   360  F4    RSBPL CT L $         594
AREA CALCULATION     SLA  6600  F4    RS P     P $ PLOTR, 2D CONTOUR PLOTS &        578
ARES2, RESONANCE INTEGRAL X-SECTION CALC       AI   7090  F2    RS PL   T A $         89
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ARES2, RESONANCE INTEGRAL X-SECTION CALC        CDC  1604  F63   RS PL  T A $      89
ARGONNE SUBROUTINE LIBRARY CAT. A-E  ANL   360  F+P+A RS      T P $ AMDLIBAE,     562
ARGONNE SUBROUTINE LIBRARY CAT. F    ANL   360  F+BAL RS      T P $ AMDLIBF,      563
ARGONNE SUBROUTINE LIBRARY CAT. G-Z  ANL   360  F+P+A RS      T P $ AMDLIBGZ,     564
ARGUS, TRANSIENT TEMPERATURE CALC CYLINDER      ANL  3600  F63   RSBP   T H $     152
ASAF4 RS P   T M $ ETOE, ENDF/B TO MC**2 DATA CONVERSION          APDA 3600        350
ASME STEAM AND WATER PROPERTIES BG&E  360B F4     RS      T H $ STEAM-67, 1967     487
ASPIS, GAMMA RAY SOURCE BUILDUP FACTOR CALC     BAPL 6600  F+ASC RS P   T J $     429
ASSAULT, 2-D MULTI-GP DIFFUSION DEPLETION CODE ORNL 7090  F+FAP RS P   T D $      240
ASSEMBLER FOR FLOCO2 INSTRUCTION SET       PW   1604  F+COP RS P   T P $ LAG,     186
ASSEMBLER FOR THE PDP-11 ON 360 ANC   360  PL1   RS P   T P $ PTAC11, 2-PASS      516
ASSEMBLY ANALYSIS   AI   7600  F4    RS PLX T C $ VIM1, MONTE CARLO CRITICAL      510
ASSEMBLY ANALYSIS  AI-A  360  F4    RSBPL CT C $ VIMIX, MONTE CARLO CRITICAL      510
ASSEMBLY 48 GAFGAR ENDF/B DATA TAPES   GGA  1108  BIN   R   L  T Z $ ZPR-III      356
ASTEM, THERMODYNAMIC PROPERTIES WATER & STEAM  ANC   360  F4    RS P   T H $      580
ATHENA4, INELASTIC SCATTERING FORM FACTORS      ORNL  360  F4    RS P   T A $     417
ATOM SPECTRA ENDF/B DATA  ORNL  360  F4    RS P   T B $ RICE, PRIMARY RECOIL     453
ATTENUATION CYL SPHERE GEOM  AI   7090  F2    RS P     J $ GRACE2, GAMMA-RAY        46
ATTENUATION CYL SPHERE GEOM  CDC  1604  F63   RS P     J $ GRACE2, GAMMA-RAY        46
ATTENUATION SLAB GEOMETRY    AI   7090  F2    RS P     J $ GRACE1, GAMMA-RAY        45
ATTENUATION SLAB GEOMETRY    CDC  1604  F63   RS P     J $ GRACE1, GAMMA-RAY        45
AUTO- AND CROSS-SPECTRAL DENSITIES      BNW  1108  F5    RS P X T F $ NOISY1,     488
AUTO- AND CROSS-SPECTRAL DENSITIES      BNW  7090  F4    RS P   T F $ NOISY1,     488
AVERAGE X-SEC CALC  BNL  6600  F4    RS P     A $ AVERAGE, UNRESOLVED REGION      376
AVERAGE X-SEC CALC  BNL  7094  F4    RS P     A $ AVERAGE, UNRESOLVED REGION      376
AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC  BNL  6600  F4    RS P     A $       376
AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC  BNL  7094  F4    RS P     A $       376
AVERAGING     GGA  7044  F4    RS P     L $ GAVER, ENERGY INTERVAL X-SECTION     218
AVOID, ANNULAR VOID X-SECTION CALCULATION       GEC   625  F4    RS P     B $     276
AX-TNT, COUPLED NEUTRONICS-HYDRODYNAMICS SPH   PW   1604  F63   RS P     F $       191
AXFLU, HEAT TRANSFER MOLTEN FUEL TUBE BUNDLES   LASL 7094  F2    RSBP     H $       182
AXISYM LOAD  BAPL 6600  F4    RS P   T I $ SEALSHELL2, SHELL STRESS ANALYSIS      282
AXISYM LOAD  SR   360  F4    RS P   T I $ SEALSHELL2, SHELL STRESS ANALYSIS      282
AXISYM LOAD  WTSC 6600B F4    RS P   T I $ SEAL SHELL, SHELL STRESS ANALYSIS      282
AXISYMMETRIC & PLANE ELASTIC-PLASTIC BAPL 6600  F+COM RS P   T I $ DUZ2, 2-D      503
AXISYMMETRIC LOAD   GGA  7044  F4    RSBP  CT I $ SAFE-PCRS, STRESS ANALYSIS     250
AXISYMMETRIC LOAD GGA  7044  F4    RS P   T I $ SAFE-AXISYM, STRESS ANALYSIS     251
AXISYMMETRIC STRESS ANALYSIS  GGA  1108  F4    RS P     I $ SAFE-2D, PLANE &     379
AXTHRM, HEAT TRANSFER SOLID FUEL TUBE BUNDLES   LASL 7094  F2    RSBP     H $       183
AX1, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE    CDC  3600  F63   RSBP     F $       102
B-W MULTI-LEVEL CONVOLUTION    PPCO 7040  F+MAP RS P     A $ COMBCO, COMBINED      203
B-W PARAMETERS    GGA  1108  F5    RS P  CT A $ FSDP3, POINTWISE XSECS. FROM      216
B-W RESONANCE PARAMETERS  WANL 7094  F2    RS P     A $ EXT, X-SECTIONS FROM      238
B-W X-SEC CALC    BNL  6600  F4    RS P     A $ SIGPLOT, RESOLVED MULTILEVEL     377
BAL   RS    CT P $ SLACMON 2.2, CS360 MVT/MFT PERFORMANCE MONITOR SLAC  360       635
BAL   RSB   T P $ NRTS-RJE, OS/360 MVT REMOTE JOB ENTRY SYSTEM   ANC   360        519
BAL   RSB  X T P $ COPYCAT, IBM OS SYSTEM CATALOG UTILITY ROUTINE ANL   360B      646
BAL+F RS P  CT P $ GETCOR,FRECOR, FORTRAN DYNAMIC STORAGE ALLOC   ORNL  360       644
BAM, S4 CYL CELL CODE AND TEMPEST COMBINATION  AI   7090  F2    RS P     B $       108
BAPL 6600  F+ASC RS P   T J $ ASPIS, GAMMA RAY SOURCE BUILDUP FACTOR CALC         429
BAPL 6600  F+ASC RS P X T B $ RESQ2,RESCO,DBF1, RESONANCE INTEGRAL HEX CELL       285
BAPL 6600  F+COM RS P     H $ HYMAS, HYDRODYNAMIC MASS MATRIX GENERATION          560
BAPL 6600  F+COM RS P   T I $ DUZ2, 2-D AXISYMMETRIC & PLANE ELASTIC-PLASTIC      503
BAPL 6600  F+COM RS P   T I $ GAPL3, INELASTIC LARGE DEFLECTION STRESS STUDY      397
BAPL 6600  F+COM RS P X T B $ PAX03, HARMONY-PDQ X-SECTION GENERATION CODE        426
BAPL 6600  F+COM RS P X T I $ MATUS, 3-D FINITE ELEMENT ELASTIC ANALYSIS          597
BAPL 6600  F4    RS     T B $ MO807, 2-D DIFFUSION ABSORPTION REMOVAL X-SECS      280
BAPL 6600  F4    RS     T C $ MO648, 1-D SLAB TRANSPORT WITH SLOWING DOWN         342
BAPL 6600  F4    RS     T H $ WATER, STEAM TABLES 14.5-14,500PSIA 32-472DEGF      267
BAPL 6600  F4    RS     T I $ CYGRO2, STRESS ANALYSIS CYL FUEL ELEMENT            266
BAPL 6600  F4    RS P     A $ GRAMP, R-M PARAMETERS OF UNRESOLVED RESONANCES      470
BAPL 6600  F4    RS P     D $ CINDER,MO102, POINT DEPLETION FISSION PRODUCT       313
BAPL 6600  F4    RS P     I $ STRIPE, FUEL ROD CLAD STRAIN & PELLET CRACKING      570
BAPL 6600  F4    RS P     I $ TCB01, CREEP-BUCKLING OF TUBES UNDER PRESSURE       604
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BAPL 6600  F4     RS P      P $ BH99, EXTREME VALUE DISTRIBUTION DATA ANALYSIS     621
BAPL 6600  F4     RS P      P $ RELC1, RELIABILITY FOR A SINGLE FAILURE MODE       497
BAPL 6600  F4     RS P    T A $ PUN1, UNRESOLVED RESONANCE INTEGRALS X-SECS        359
BAPL 6600  F4     RS P    T A $ SUMOR, S-WAVE NEUTRON X-SECTION CALCULATION        399
BAPL 6600  F4     RS P    T B $ EPOCH, NEUTRON AGE CALCULATION OF ENDF/B DATA      461
BAPL 6600  F4     RS P    T C $ BE21, FEW-GP DISCRETE ORDINATES SLAB GEOMETRY      398
BAPL 6600  F4     RS P    T F $ NCWIG, 1-D 2-GP KINETICS TEMPERATURE FEEDBACK      371
BAPL 6600  F4     RS P    T F $ TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK      338
BAPL 6600  F4     RS P    T F $ WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM        274
BAPL 6600  F4     RS P    T G $ FLASH3, LOSS-OF-COOLANT ACCIDENT ANALYSIS          295
BAPL 6600  F4     RS P    T G $ FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION        448
BAPL 6600  F4     RS P    T G $ MO555,ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS      284
BAPL 6600  F4     RS P    T H $ CHIC-KIN, FAST + INTERMEDIATE POWER TRANSIENTS     473
BAPL 6600  F4     RS P    T H $ FIGRO, LWBR FUEL SWELLING TEMPERATURE STUDY        272
BAPL 6600  F4     RS P    T H $ FLOT1,MO219, PWR FLOW TRANSIENT ANALYSIS           331
BAPL 6600  F4     RS P    T H $ GLUB1, WATER-LOGGED FUEL ELEMENT ANALYSIS          424
BAPL 6600  F4     RS P    T H $ HCT2, 2-D TRANSIENT HEAT CONDUCTION PROGRAM        286
BAPL 6600  F4     RS P    T H $ MO899,HOH, STEAM TABLES 14.5-2538 PSIA             294
BAPL 6600  F4     RS P    T H $ TOPS, TRANSIENT THERMODYNAMICS OF PRESSURIZERS     348
BAPL 6600  F4     RS P    T H $ WASP, WATER AND STEAM THERMODYNAMIC PROPERTIES     396
BAPL 6600  F4     RS P    T I $ BUBL1, FUEL SWELLING & GAS RELEASE SIMULATION      468
BAPL 6600  F4     RS P    T I $ BUSHL, CYL SHELL BUCKLING COLLAPSE ANALYSIS        481
BAPL 6600  F4     RS P    T I $ CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION        449
BAPL 6600  F4     RS P    T I $ FUGIT, DYNAMIC RESPONSE OF ELASTIC STRUCTURES      537
BAPL 6600  F4     RS P    T I $ MO266, LINEAR ELASTIC STRUCTURAL DYNAMICS          383
BAPL 6600  F4     RS P    T I $ MO457,PIPE, ELASTIC STRESS OF PIPING SYSTEM        329
BAPL 6600  F4     RS P    T I $ MO552, DYNAMIC ANALYSIS LINEAR ELASTIC SYSTEMS     283
BAPL 6600  F4     RS P    T I $ PELEN, FUEL PELLET TEMPERATURE & DEFORMATION       598
BAPL 6600  F4     RS P    T I $ SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD      282
BAPL 6600  F4     RS P    T J $ MO756,LETO, 1-D SLAB GAMMA-RAY TRANSPORT           343
BAPL 6600  F4     RS P    T L $ BL47, DRAFTING TOOL TO PLOT PLANE STRUCTURES       373
BAPL 6600  F4     RS P    T M $ SHLOG, DATA MANAGEMENT, EDITING, & ANALYSIS        557
BAPL 6600  F4     RS P    T O $ BETTY, ENTRAINED PARTICLES SAMPLING STUDY          545
BAPL 6600  F4     RS P    T O $ JITER, FLUCTUATION EXPERIMENT ANALYSIS             394
BAPL 6600  F4     RS P    T O $ REDUX, REACTOR FLUCTUATION EXPERIMENT ANALYSIS     425
BAPL 6600  F4     RS P    T P $ DAFT1, LEAST SQUARES FIT FISSILE NUCLIDE DATA      327
BAPL 6600  F4     RS P    T P $ MO661,MO657,MO626, POLYNOMIAL CURVE FITTING        411
BAPL 6600A F+ASC  RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.     478
BAPL 6600A F+ASC  RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION        275
BAPL 6600B F+ASC  RS P    T J $ SPAN4, A POINT-KERNEL SHIELD EVALUATION CODE       462
BAPL 6600B F4     RS P    T I $ MANE1, RECTANGULAR MAGNETIC NETWORK SOLUTION       412
BAPL 6600C F+ASC  RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION        275
BASIC R          M $ MAPPER, PREDICTING MANUFACTURING REQUIREMENTS  GEPI GETS      595
BATCH ANALYSIS OF GAMMA-RAY SPECTRA    ANC   360  F+P+A RSBP XCT W $ GAUSS6,       622
BC     625  F+MAP RS P    T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM       209
BC     625  F4    RS      T C $ EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM      156
BC     625  F4    RS      T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE      28
BC     625  F4    RS PLX T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV         185
BCD    R    L  T Z $ ETOG1 DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2    WAPD 6600     447
BCD    R    LX T Z $ LASL XSEC SETS, SN 18- 24- AND 25-GROUP SETS   LASL 6600      532
BCD    R    LX T Z $ THERMOS LIBRARY, 30-GP ENDF/B SCAT KERNELS     DP    360     543
BCD INPUT DATA PROCESSING MODULE   ANL   360  F4    RSBP  CT L $ ARC-NUI002,       533
BCL  6400  F4     RS P      G $ FRCRL2, LOCA FISSION PRODUCT RELEASE ANALYSIS      500
BCL  6400  F4     RS P    T F $ ADEP, 1D AND 2D FEW-GROUP SPACE-TIME KINETICS      494
BCL  6400  F4     RS P    T G $ ECCSA4, LOSS-OF-COOLANT & EMERGENCY COOLING        330
BCL  6400  F4     RS P    T G $ NURLOC-1.0, LOSS-OF-COOLANT THERMAL ANALYSIS       328
BCL  6400  F4     RS P X    G $ MIRAB,MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL     499
BCL  6400  F4     RS P X T G $ MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC        508
BCS  6600D F+ASC R B      T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION        275
BEAMS    ANL  3600  F36    SBP      I $ BOW2, DEFLECTION CALCULATION PARALLEL     365
BEAMS  KAPL 6600  F4     RS P      I $ STEM, MATRIX GENERATION FOR A SYSTEM OF    337
BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS    SLA   360  COBOL RSBP  CT M $      589
BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS    SLA  1108  COBOL RS P      M $    589
BEHAVE2, OXIDE FUEL PERFORMANCE FINITE-ELEMENT GESV  635  F4    RS P  CT I $       568
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BEHAVIOR      ANL   360  F4    RS P   T I $ LIFE1, FAST REACTOR FUEL ELEMENT     460
BESFIT, DIFFRACTION MODEL ELASTIC SCAT X-SEC   BNL  6600  F4    RS P     A $    524
BETTIS ENVIRNMNTL LIB SCOPE2.0 CEND 7600B F4    RS     T P $ MODEL, MODIFIED    478
BETTIS ENVIRNMNTL LIB SCOPE3.2 CDC  6600C F+COM RS     T P $ MODEL, MODIFIED    478
BETTIS ENVIRNMNTL LIB SCOPE3.3 CDC  6600D F+COM RS     T P $ MODEL, MODIFIED    478
BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BAPL 6600A F+ASC RS     T P $   478
BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BW   6600B F+ASC RS     T P $   478
BETTY, ENTRAINED PARTICLES SAMPLING STUDY      BAPL 6600  F4    RS P   T C $   545
BE21, FEW-GP DISCRETE ORDINATES SLAB GEOMETRY  BAPL 6600  F4    RS P   T C $   398
BG&E  360B F4    RS     T H $ STEAM-67, 1967 ASME STEAM AND WATER PROPERTIES   487
BHSC  360  F4    RS P     C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES      30
BHSC  360  F4    RS P   T C $ FAIMOS, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   120
BHSC  360  F4    RS PL  T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS     50
BH99, EXTREME VALUE DISTRIBLTION DATA ANALYSIS BAPL 6600  F4    RS P     P $   621
BIGDEAL, SPENT YANKEE-FUEL TEMPERATURE CALC    CRNL 1604  F2    RS P     H $   549
BIN   R   L  T Z $ ZPR-III ASSEMBLY 48 GAFGAR ENDF/B DATA TAPES   GGA  1108    356
BINARY LIBRARY TAPE MAINTENANCE  ANL   360  F4    RS       M $ MERMC2, MC**2    472
BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS   GEES 1108  F5    RS P   T C $ CAGE,   476
BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC   NED   635  F4    RS PL  T C $   287
BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC   NED  1108  F4    RS P   T C $   287
BKC   360  F4    RSBP     P $ GRAPH, LINEAR REGRESSION W/CONFIDENCE LIMITS     624
BKC   360  F4    RSBP     P $ HISTOGRAMS, QUALITY CONTROL SAMPLE STATISTICS    614
BLAST, REACTOR KINETICS TEMPERATURE DIST STUDY AEB   360  F4    RS P     E $   363
BLOOST5, POINT-KINETICS WITH 2-D HEAT TRANSFER GGA  7044  F+MAP RS P   T H $   205
BLOOST6, COMBINED KINETICS 2-D HEAT TRANSFER   GGA  1108  F+BAL RS P   T E $   303
BLOWDOWN  PPCO  360  F4    RS P X   G $ BURST1, HYDRODYNAMIC ANALYSIS DURING    435
BLOWDOWN - EXCURSION ANALYSIS  ANC   360  F4    RSBP XCT G $ RELAP3, REACTOR   369
BLOWDOWN - EXCURSION ANALYSIS  ANC  1108  F4    RS P   T G $ RELAP3, REACTOR   369
BLOWDOWN - EXCURSION ANALYSIS  ANC  6600  F4    RS P   T G $ RELAP3, REACTOR   369
BLOWDOWN ANALYSIS LOFT    KE   7094  F+MAP RSBP   T G $ SATURATED BLOWDOWN2,   200
BLOWDOWN ANALYSIS LOFT    UCA   360  F4    RS P     G $ WATER-HAMMER, LIQUID   278
BLOWDOWN PRESSURE TEMPERATURE HISTORY     KE   7094  F2    RSBP   T H $ PTH1,  155
BLOWDOWN2, BLOWDOWN ANALYSIS LOFT    KE   7094  F+MAP RSBP   T G $ SATURATED   200
BL47, DRAFTING TOOL TO PLOT PLANE STRUCTURES   BAPL 6600  F4    RS P   T L $   373
BNL  6600  F4    RS     T M $ CHECK3,RIGEL3, ENDF/B V3 PROCESSING CODES        571
BNL  6600  F4    RS P     A $ AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC    376
BNL  6600  F4    RS P     A $ BESFIT, DIFFRACTION MODEL ELASTIC SCAT X-SEC     524
BNL  6600  F4    RS P     A $ RAMP1, REICH-MOORE RESOLVED REGION X-SECTIONS    492
BNL  6600  F4    RS P     A $ SIGPLOT, RESOLVED MULTILEVEL B-W X-SEC CALC      377
BNL  6600  F4    RS P     A $ THRESH, STATISTICAL MODEL REACTION X-SECTIONS    504
BNL  6600  F4    RS P   T F $ NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK   405
BNL  6600  F4    RS P   T I $ SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES    252
BNL  6600B F4    RS     T M $ CHECKER,CRECT,CAMMET,PLOTFB,... ENDF/B V1 PROC   384
BNL  6600B F4    RS     T M $ CRECT,CHECKER,RIGEL,PLOTFB,... ENDF/B V2 PROC    475
BNL  6600B F4    RS     T M $ RIGEL4,CHECK4,... ENDF/B V4 PROCESSING CODES     638
BNL  6600B F4    RS P   T A $ RESEND,ADLER, ENDF/B RESONANCE XSECTION CODES    465
BNL  7090  F+FAP RS P   T M $ DFSR, DATA FILE SERVICE ROUTINES ENDF TAPES      236
BNL  7094  F4    RS P     A $ AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC    376
BNW   360C F4    RS P   T H $ COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS   432
BNW  1107  F4    RS P   T C $ HFN, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE      241
BNW  1107  F4    RS PL  T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV      185
BNW  1108  F+BAL RS P   T D $ GSSLRN1B, LEAST SQUARES PHOTOPEAK SPECTRA CODE   457
BNW  1108  F4    RS P     C $ PERT4, 2-D PERTURBATION XY RZ RTHETA GEOMETRY    304
BNW  1108  F4    RS P   T B $ FCC4, FUNDAMENTAL MODE FAST REACTOR X-SEC CALC   306
BNW  1108  F4    RS P   T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION      325
BNW  1108  F4    RS P   T H $ GAPCON-THERMAL1, FUEL PIN GAP CONDUCTANCE CALC  618
BNW  1108  F4    RS P X T B $ 1DX, 1-D DIFFUSION FAST X-SECTION GENERATION     374
BNW  1108  F4    RS PLX T B $ HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS   467
BNW  1108  F5    RS P   T D $ DBUFIT1, LEAST SQUARES TRANSMUTATION ANALYSIS    456
BNW  1108  F5    RS P   T H $ REPP, THERMAL-HYDRAULIC WATER REACTOR DESIGN     483
BNW  1108  F5    RS P X T F $ NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES       488
BNW  1108  F5    RS PLX T B $ BRT1, THERMAL SPECTRUM X-SECTION CALC            184
BNW  1108  F5    RSBPL  T D $ ISOGEN, RADIONUCLIDE GENERATION AND DECAY        367
BNW  1108C F4    RS P   T H $ COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS   432
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BNW  6600C F4    RS P   T H $ CCBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS    432
BNW  7090  F+FAP RS PL  T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV       185
BNW  7090  FLCCO RSBP   T C $ GE-HAPO-S13, 1-D MULTI-GP CCLBLE SN APPROX        75
BNW  7090  F2    RSBPL  T J $ MAC, SHIELD DESIGN MULTIGRCUP SLAB GEOMETRY       143
BNW  7090  F4    RS P   T F $ NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES         488
BODIES  BNL  6600  F4    RS P   T I $ SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D    252
BODIES  GGA  1108  F4    RS P     I $ SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D    252
BOILING FLOW STEAM     GGA  1108  F4    RS P   T H $ DYNAM, DYNAMIC ANALYSIS    440
BORATION-DILUTION TABLES FOR PWR CPN  OPPD 6400  F4    S P     H $ PWR-PPM,     552
BOUNCE, FLUX DIST IN MULTI-PIN FUEL ELEMENT    AGC  7090  F2    RS P     B $    237
BOWED REACTOR CORES ANL   360B F4    PS P     I $ NUBOW, STRUCTURAL ANALYSIS    643
BOW2, DEFLECTION CALCULATION PARALLEL BEAMS    ANL  360C  F36   SBP     I $    365
BREEDERS    NED   635  F4    RS P     D $ RAPFU, FUEL CYCLE PARAMETERS FAST    372
BRT1, THERMAL SPECTRUM X-SECTION CALC          BNW  1108  F5    RS PLX T B $    184
BUBL1, FUEL SWELLING & GAS RELEASE SIMULATION  BAPL 6600  F4    RS P   T I $    468
BUCKLING COLLAPSE ANALYSIS    BAPL 6600  F4    RS P   T I $ BUSHL, CYL SHELL    481
BUCKLING CYL FUEL ELEMENTS    AEB  360   F4    RS P     B $ WELWING, MATERIAL   362
BUGTRI, 2-D MULTIGP DIFFUSION+BURNUP TRI-MESH  GGA  1108  F+BAL RS P   T C $    439
BUG2, 2-D MULTIGRCUP DIFFUSION & BURNUP XY, RZ GGA  1108  F+BAL RS P   T C $    438
BUILDUP FACTOR CALC    BAPL 6600  F+ASC RS P   T J $ ASPIS, GAMMA RAY SOURCE    429
BUNDLE    NED   635  F4    RS P   T H $ VELVFT2, TURBULENT FLOW IN LMFBR RCD    458
BUNDLE CHF DATA ANALYSIS      ANC  360   F4    RS PL CT M $ ERPEST, LOCA RCD    518
BUNDLE FLOW & TEMPERATURE DIST.   CRNL  360  F4    RS P   T H $ CRRIBLE, RCD    629
BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   360C F4    RS P   T H $ COBRA3C, RCD    432
BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   1108C F4   RS P   T H $ COBRA3C, RCD    432
BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   6600C F4   RS P   T H $ COBRA3C, RCD    432
BUNDLES  LASL 7094  F2    RSBP     H $ AXFLU, HEAT TRANSFER MOLTEN FUEL TUBE    182
BUNDLES  LASL 7094  F2    RSBP     H $ AXTHRM, HEAT TRANSFER SOLID FUEL TUBE    183
BURNUP & MANAGEMENT  NED   635  F4    RS P   T D $ FUMBLE, FAST REACTOR FUEL    480
BURNUP ANALYSIS  ANL   360   F4    RS P   CT D $ 3DB, 3-D MULTIGRCUP DIFFUSION  567
BURNUP ANALYSIS  HEDL 1108  F4    RS P   T D $ 3DB, 3-D MULTIGRCUP DIFFUSION   567
BURNUP ANALYSIS NED   635  F4    RS P   T D $ BURNUP, HEAVY ELEMENT ISOTOPIC    311
BURNUP CYL LATTICE   TVA   360  F4    RSBPLXCT B $ LASER, SPECTRUM CALC WITH   249
BURNUP CYL LATTICE   WAPD 7094  F+MAP RS PLX T B $ LASER, SPECTRUM CALC WITH   249
BURNUP POWER DISTRIBUTION SEARCH    GGA  1108  F4    RS P   T C $ GASP7, 1-D    319
BURNUP REFUELING HISTORY  LASL 6600  F4    RS P   T D $ PHENIX, 2D DIFFUSION   454
BURNUP RZ GEOMETRY   GGA  7090  F+FAP RSBP   T D $ DDB, 2-D FEW-GP DIFFUSION    99
BURNUP XY, RZ GGA  1108  F+BAL RS P   T D $ BUG2, 2-D MULTIGROUP DIFFUSION &    438
BURNUP, HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS NED   635  F4    RS P   T C $    311
BURP1, DETECTOR EFFICIENCY POINT SOURCE        MTS  7090  MAD   RSB     O $    164
BURP2, DETECTOR EFFICIENCY DISK SOURCE         MTS  7090  MAD   RSB     O $    165
BURP3, DETECTOR EFFICIENCY POINT SOURCE        MTS  7090  MAD   RSB     O $    166
BURP4, GAMMA-RAY PHOTOFRACTION SOLID CRYSTAL   MTS  7090  MAD   RSB     C $    169
BURP5, GAMMA-RAY PHOTOFRACTION WELL CRYSTAL    MTS  7090  MAD   RSB     O $    170
BURST1, HYDRODYNAMIC ANALYSIS DURING BLOWDOWN  PECO  360  F4    RS P X   G $    435
BUSHL, CYL SHELL BUCKLING COLLAPSE ANALYSIS    BAPL 6600  F4    RS P   T I $    481
BW   2000  F4    RS       A $ STRIP, RESOLVED RESONANCE INTEGRAL CALCULATION    305
BW   6600  F+COM RS P X T D $ FARED, 1-D FAST REACTOR DESIGN & SURVEY STUDY     427
BW   6600B F+ASC RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.   478
BW   6600B F+ASC RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION      275
BWR FUEL ELEMENT HEAT TRANSFER CALC       ANC  360  F4    RSBP XCT H $ MOXY,     551
BWR FUEL ELEMENT HEAT TRANSFER CALC       ANC  1108  F4   RS P   T H $ MOXY,     551
BWR GASEOUS RELEASE  ORNL 360  F4    RS P  C  G $ STEFEG, ANALYSIS OF PWR &      583
BWR/6 ANALYSIS    EI    360  F+BAL RS P  CT H $ 6KILER, CORE HEATUP CODE FOR     636
CAESAR4,LIBLST, 1-D MULTI-GP DIFFUSION + LIB   AI    360  F4    RSBPLX T C $    270
CAGE,BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS   GEES 1108  F5    RS P   T C $    476
CALCOMP PLOTTING ROUTINES       KAPL 6600  F+COM RS     T P $ KAPLPLOT, KAPL    496
CALCOMP780    ANL   360  F4    RS P   T N $ PLOT-3D, 3-D PLOTS ON IBM2280 CR    544
CAPITAL COST ESTIMATING     ORNL 360B F4    RS P   T D $ CRCOST, POWER PLANT    588
CARD INPUT PROCESSOR        LASL  360  F4    RS P     L $ GENRD, FREE-FORMAT    530
CARD INPUT PROCESSOR        LASL 6600  F4    RS P     L $ GENRD, FREE-FORMAT    530
CASCADE, COMPOUND NUCLEUS REACTION        AI    360  F+BAL RS P   T A $ COMNUC,  482
CASCADE,CLUSTER, RADIATION DAMAGE IN METALS    GEC   635  F+FAP RSBP   T C $    419
CAT. A-E  ANL   360  F+P+A RS     T P $ AMDLIBAE, ARGONNE SUBROUTINE LIBRARY    562
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CAT. F     ANL   360  F+BAL RS      T P $ AMDLIBF, ARGONNE SUBROUTINE LIBRARY     563
CAT. G-Z  ANL   360  F+P+A RS      T P $ AMDLIBCZ, ARGONNE SUBROUTINE LIBRARY    564
CATALOG    DP    360B EBCDC R   L  T Z $ GAMTAB, RADIOACTIVE-DECAY GAMMA RAY      637
CATALOG UTILITY ROUTINE ANL    360B BAL   RSB  X T P $ COPYCAT, IBM OS SYSTEM    646
CAVITY GEOM GGA  1108  F4     RS P   T J $ MUSCAT, VIEW FACTOR SHIELDING CODE    259
CDC  1604  F63   RS        C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES       30
CDC  1604  F63   RS  L  T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION         58
CDC  1604  F63   RS P      A $ HAFEVER, HAUSER-FESHBACH INELASTIC SCATTERING     14
CDC  1604  F63   RS P      B $ SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY     52
CDC  1604  F63   RS P      B $ S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION       53
CDC  1604  F63   RS P      E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK    121
CDC  1604  F63   RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD           47
CDC  1604  F63   RS P      J $ GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY       45
CDC  1604  F63   RS P      J $ GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM     46
CDC  1604  F63   RS P    T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB     87
CDC  1604  F63   RS P    T C $ FCG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE    28
CDC  1604  F63   RS P    T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY     32
CDC  1604  F63   RS P    T C $ 20GRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER    40
CDC  1604  F63   RS PL   T A $ ARES2, RESONANCE INTEGRAL X-SECTION CALC          89
CDC  1604  F63   RS PL   T B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC        51
CDC  1604  F63   RS PL   T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS     50
CDC  1604  F63   RS PL   T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE      29
CDC  1604  F63   RS PLX  T B $ GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC        33
CDC  1604  F63   RS PLX  T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE     120
CDC  3600  F63   RSBP      F $ AX1, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE     102
CDC  3600  F63   RSBP    T C $ FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION     167
CDC  6600C F+COM RS      T P $ MODEL, MODIFIED BETTIS ENVIRMNTL LIB SCOPE3.2    478
CDC  6600D F+COM RS      T P $ MODEL, MODIFIED BETTIS ENVIRMNTL LIB SCOPE3.3    478
CE   6600  F4    RS P    T C $ EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM    156
CEBUG, STEAM GENERATOR SODIUM-WATER REACTION   CEND 7600  F4    RS P   T G $    548
CELL   ANL   3600  F36   RSBP X T B $ RABBLE,WLIB,FLAT, RESONANCE ABSORPTION,   281
CELL  ANL   3600  F36   RSBP X T B $ RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG   213
CELL  BAPL 6600  F+ASC RS P X T B $ RESQ2,RESQO,DBF1, RESONANCE INTEGRAL HEX    285
CELL CALCULATION   AI    360  F+BAL RS P X T B $ HWOCR-SAFE, 2-D MONTE CARLO    307
CELL CODE AND TEMPEST COMBINATION  AI   7090  F2    RS P     B $ BAM, S4 CYL    108
CELL CODE, 1-D 1-GP S4 APPROXIMATION    AI   7090  F2    RS       B $ S4 CYL     53
CELL CODE, 1-D 1-GP S4 APPROXIMATION    CDC  1604  F63   RS P     B $ S4 CYL     53
CELL COLLISION PROBABILITY CALC ANL   360  F4    RS P   T E $ CLUP77, SQUARE    526
CELL COLLISION PROBABILITY CALC JAER  230  F4    RS P   T E $ CLUP77, SQUARE    526
CEND  360  F4    RS P X T F $ CEXE,INCEXE, 1-GP 3-D XYZ XENON OSCILLATION       415
CEND 7600  F4    RS P   T G $ CEBUG, STEAM GENERATOR SODIUM-WATER REACTION      548
CEND 7600B F4    RS     T P $ MODEL, MODIFIED BETTIS ENVIRMNTL LIB SCOPE2.0    478
CENTRIFUGAL PUMP IMPELLER DESIGN STUDY    PW   1604  F63   RS P   T I $ PIP,    187
CEXE,INCEXE, 1-GP 3-D XYZ XENON OSCILLATION    CEND  360  F4    RS P X T F $    415
CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST DATA AI   7094  F+MAP RS P     A $    215
CHAIN ANALYSIS        ORNL 1604  F63   RS P     D $ ISOCRUNCH, REACTION DECAY  180
CHAIN ANALYSIS        ORNL 7090  F2    RSBP     D $ ISOCRUNCH, REACTION DECAY  180
CHAIN EQUATIONS       ORNL 7090  F2    RSBP     D $ NUCY, SOLUTION OF NUCLIDE  134
CHAINS   GEC   635  F4    RSBP     D $ CHAINS, ANALYSIS OF RADIOACTIVE DECAY    418
CHAINS, ANALYSIS OF RADIOACTIVE DECAY CHAINS   GEC   635  F4    RSBP     D $    418
CHANNEL ANALYSIS ECC   BCL  6400  F4    RS P X T G $ MUCHA1,MUCHA2, MULTIPLE   508
CHANNEL X-SEC EVALUATION      ENEA  360  F4    RS P  CT A $ JUPITOR1, COUPLED  308
CHECKER, ENDF/B V2 PROCESSING CODES      ANL   360  F4    RS P   T M $ CRECT,   475
CHECKER,CRECT,DAMMET,PLOTFB,... ENDF/B V1 PROC BNL  6600B F4    RS     T M $    384
CHECKER,RIGEL,PLOTFB,... ENDF/B V2 PROC  BNL  6600B F4    RS     T M $ CRECT,   475
CHECK3,RIGEL3, ENDF/B V3 PROCESSING CODES      BNL  6600  F4    RS     T M $    571
CHECK4,... ENDF/B V4 PROCESSING CODES   BNL  6600B F4    RS     T M $ RIGEL4,   638
CHEMLOC2, CORE HEATING CLADDING-STEAM REACTION ANL   3600  F36   RSBP     G $    366
CHF DATA ANALYSIS     ANC   360  F4    RS PL CT M $ ERREST, LOCA ROD BUNDLE    518
CHI  1108  F4    RS P   T H $ LICN, 3-D TEMPERATURE DISTRIBUTION PROGRAM        299
CHIC-KIN, FAST + INTERMEDIATE POWER TRANSIENTS BAPL 6600  F4    RS P   T H $    473
CHILES, LINEAR ELASTIC SINGULARITY MODELING    SLA  6600  FTN   RS P   T I $    611
CHORD DIST FUNCT   AEG  7090  F2    RS       B $ DANCOFF JR, MODERATOR SPACE   150
CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS  CWE   360  F4    RS P   T C $    354
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CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS  WAPD 6600  F4    RS P    T D $    354
CINDER,M0102, POINT DEPLETION FISSION PRODUCT  BAPL 6600  F4    RS P      C $    313
CINDER,M0102, POINT DEPLETION FISSION PRODUCT  DP    360  F+BAL RS P    T D $    313
CITATION, 1,2,3-D DIFFUSION DEPLETION MULTIGP  ORNL  360F F4    RS P    T K $    387
CLAD STRAIN & PELLET CRACKING BAPL 6600  F4    RS P      I $ STRIPE, FUEL ROD     570
CLADDING-STEAM REACTION ANL  3600  F36   RSBP      G $ CHEMLOC2, CORE HEATING     366
CLEM, ANGULAR DISTRIBUTION LEGENDRE FITTING    KAPL 6600  F4    RS P      A $    531
CLIP, FORM OR THRECES LIBRARY UTILITY ROUTINE  AI    360  F4    RSB L   T M $    271
CLOTHO, NUCLEAR POWER PLANT COST CODE HEDL 1108  F5    RS P X T C $ PACTCLUS,    540
CLOUD        AI   7090  F2    RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A     47
CLOUD        CDC  1604  F63   RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A     47
CLOUD        DP    360  F4    RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A     47
CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD        AI   7090  F2    RS P      G $     47
CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD        CDC  1604  F63   RS P      G $     47
CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD        DP    360  F4    RS P      G $     47
CLUP77, SQUARE CELL COLLISION PROBABILITY CALC ANL   360  F4    RS P    T B $    526
CLUP77, SQUARE CELL COLLISION PROBABILITY CALC JAER  230  F4    RS P    T B $    526
CLUSTER, RADIATION DAMAGE IN METALS    GEC   635  F+FAP RSBP    T O $ CASCADE,   419
CMPXMAT, TRANSFER FUNCTION EVALUATION          PW   1604  F63   RS P      E $    188
CNEA  360  F4    RS P      E $ TRIFIDO, PULSED NEUTRON SOURCE DATA ANALYSIS       489
COAGULATION OF HETEROGENEOUS AEROSOLS    AI    360  F4    RS P    T G $ HAA3,      443
COBOL RS P      M $ AEC-ALO FAU, RADIO FREQUENCY MANAGEMENT SYSTEM ALCC  360      587
COBOL RS P      M $ BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS   SLA  1108      589
COBOL RSBP  CT M $ BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS   SLA   360      589
COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   3600 F4    RS P    T H $    432
COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   1108C F4    RS P    T H $    432
COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW   6600C F4    RS P    T H $    432
CODILLI, LEAST SQUARES ANALYSIS RESONANCE DATA UILL  360  F4    RS P      A $    347
COEF CALC      GGA  7044  F4    RS P    T C $ TEMCO, 1-D FEW-GP DIFFUSION TEMP   225
COEF CALC FOR ANGULAR DIST  GGA  7044  F4    RS P X    A $ LEGCOEF3, LEGENDRE   217
COEF CALC FOR ANGULAR DIST DATA AI   7094  F+MAP RS P      A $ CHAD, LEGENDRE     215
COEFFICIENT CALCULATION    GGA  1108  F4    RS P    T C $ TEMCO7, TEMPERATURE    320
COEFFICIENTS   LLL  7090  F+FAP RS P    T B $ SOPHIST1/2/5, MULTI-GP TRANSFER    160
COHBE, COHERENT INELASTIC SCATTERING LAW CALC  GGA  1108  F4    RS P X    A $    385
COHERENT INELASTIC SCATTERING LAW CALC  GGA  1108  F4    RS P X    A $ COHBE,     385
COINC, COINCIDENCE COUNTING DATA REDUCTION     ANL  3600  F63   RSBP      C $    248
COINCIDENCE COUNTING DATA REDUCTION      ANL  3600  F63   RSBP      O $ COINC,     248
COLLAPSE ANALYSIS    BAPL 6600  F4    RS P    T I $ BUSHL, CYL SHELL BUCKLING    481
COLLAPSING        TRW  6500  F4    RS P      B $ PARTI, OPTIMAL GROUP OR MESH     416
COLLAPSING  APRF 6600  F4    RS        B $ APRFX1, 99-GP DLC-2B LIBRARY GROUP    466
COLLISION PROBABILITIES MC  ORNL  3608 F+BAL RS P    T B $ RAFFLE, 1ST FLIGHT     392
COLLISION PROBABILITY CALC ANL   360  F4    RS P    T B $ CLUP77, SQUARE CELL    526
COLLISION PROBABILITY CALC JAER  230  F4    RS P    T B $ CLUP77, SQUARE CELL    526
COMBCO, COMBINED B-W MULTI-LEVEL CONVOLUTION   PPCO 7040  F+MAP RS P      A $    203
COMNUC,CASCADE, COMPOUND NUCLEUS REACTION      AI    360  F+BAL RS P    T A $    482
COMPLEMENTARY ERROR FUNCTION SLA  6600  F4    RS P      P $ ERF,ERFC, ERROR &    601
COMPLEX GAMMA-RAY SPECTRA ANALYSIS     KAPL 6600  F4    RS      T O $ GASPAN,    485
COMPLEX GAMMA-RAY SPECTRA KSUN  360  F4    RS P      O $ CORGAM, UNFOLDING OF     390
COMPOSITE STRUCTURE STRESS STUDY  GGA  1108  F4    RS P    T I $ SAFE-3D, 3-D       332
COMPOSITE STRUCTURE STRESS STUDY  ORNL  360  F+BAL RS P    T I $ SAFE-3D, 3-D       332
COMPOSITION-DEPENDENT X-SECS  GESV  635  F+GMP RS P XCT L $ TDOWN, SPATIAL &        505
COMPOUND NUCLEUS REACTION      AI    360  F+BAL RS P    T A $ COMNUC,CASCADE,    482
COMPOUND NUCLEUS X-SECTION CALC        ANL  3600  F63   RSBP      A $ NEARREX,     171
COMPUTER-PRODUCED WIRING LISTS UHTREX  LASL 7090  F+FAP RS P      I $ WIREX,       315
CONCEPTUAL COST ESTIMATE ORNL  360C F4    RS P XCT D $ CONCEPT3, POWER PLANT       498
CONCEPT3, POWER PLANT CONCEPTUAL COST ESTIMATE ORNL  360C F4    RS P XCT D $       498
CONCRETE     GGA  1108  F4    RS P      I $ SAFE-CREEP, VISCOELASTIC ANALYSIS    300
CONCRETE  GGA  1108  F5    RS P    T I $ SAFE-CRACK, VISCOELASTIC ANALYSIS OF   451
CONDUCTANCE CALC BNW  1108  F4    RS P    T H $ GAPCON-THERMAL1, FUEL PIN GAP      618
CONDUCTION      PPCO 7044  F+MAP RS P    T H $ TOODEE, 2-D TIME-DEPENDENT HEAT    349
CONDUCTION   ORNL  360  F4    RS P X T H $ ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT       525
CONDUCTION LUMPED MASS    LASL 7030  F4    RS      T H $ RATH, 2- OR 3-D HEAT       242
CONDUCTION LUMPED MASS    LASL 7094  FAP   RS P    T H $ RATH, 2- OR 3-D HEAT       242
CONDUCTION PROGRAM    BAPL 6600  F4    RS P    T H $ HOT2, 2-D TRANSIENT HEAT       286
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CONDUCTION PROGRAM	ORNL	360	F4	RS P	T H	$ HEATING3, 1,2, OR 3-D HEAT		517
CONEC, COUPLED NEUTRONICS-HYDRODYNAMICS	SPHERE	LLL	7090	F2	RS P	F $		129
CONFIGURATION FUEL TEMPERATURE CODE	GGA	7044	F4	RS	I	$ CORE, CORE		233
CONSTANT & FAST SPECTRA CALC	ANC	360	F4	RS PLX	CT B	$ PHRCG, MULTI-GP		520
CONSTANT CALC	AGC	7090	F+FAP	RSBPLX	T B	$ AGN-GAM, FAST SPECTRUM MULTI-GP		204
CONSTANT CALC FROM TOR OUTPUT DATA	LASL	6600	F4	RS P	T B	$ GLEN, GROUP		361
CONSTANT CALC 0 TO 10 MEV	BC	625	F4	RS PLX	T B	$ GAMTEC2, MULTI-GP		185
CONSTANT CALC 0 TO 10 MEV	BNW	1107	F4	RS PL	T B	$ GAMTEC2, MULTI-GP		185
CONSTANT CALC 0 TO 10 MEV	BNW	7090	F+FAP	RS PL	T B	$ GAMTEC2, MULTI-GP		185
CONSTANT CALC 0 TO 10 MEV	UVA	6400	F4	RS PLX	T B	$ GAMTEC2, MULTI-GP		185
CONSTANTS ANC	360	F4	RS PL	CT B	$ INCITE, THERMAL SPECTRA & MULTI-GP			565
CONSTANTS ORNL	360	F4	RS PLX	T B	$ XSDRN, DISCRETE ORDINATE MULTIGROUP			393
CONSTANTS BNW	1108	F4	RS PLX	T B	$ HRG3, SLOWING-DOWN SPECTRUM, MULTIGP			467
CONSTANTS FOR DSN TDC	PW	1604	F63	RS P	L	$ SNC, CALCULATION OF SN		189
CONSTANTS FROM ENDF/B DATA	GESV	635	F+GMP	RS P	XCT B	$ ENDRUN2, MULTIGROUP		501
CONSTANTS FROM ENDF/B FOR 1DX	HEDL	1108B	F4	RS P	X T B	$ ETOX3, MULTI-GF		388
CONSTANTS GENERATION	ORNL	360	F4	RS P	T B	$ SUPERTCG, ENDF/B FINE-GP		431
CONSTANTS TVA	360	F4	RS PLX	T B	$ HRG3, SLOWING-DOWN SPECTRUM, MULTIGP			467
CONTAINMENT PRESSURE POST RUPTURE	GGA	7044	F4	RS	X T G	$ PRECON, HTGR		228
CONTAINMENT SYSTEM IODINE REMOVAL	BCL	6400	F4	RS P X	G	$ MIRAB,MIRAP,		499
CONTEMPT-LT/022, PRESSURE-TEMPERATURE RESPONSE	ANC	360B	F+BAL	RSBP	CT G	$		433
CONTOUR PLOTS & AREA CALCULATION	SLA	6600	F4	RS P	P	$ PLOTR, 2D		578
CONTROL SAMPLE STATISTICS	BKC	360	F4	RSBP	P	$ HISTOGRAMS, QUALITY		614
CONVERSION	ANL	360	F4	RS P	CT M	$ ETOE, ENDF/B TO MC**2 DATA		350
CONVERSION	APDA	3600	ASAF4	RS P	T M	$ ETOE, ENDF/B TO MC**2 DATA		350
CONVERTS R-MATRIX RESONANCE PARAMETERS	ORNL	360	F4	RS P	A	$ POLLA,		639
CONVOLUTION PPCO	7040	F+MAP	RS P	A	$ COMBCO, COMBINED B-W MULTI-LEVEL			203
COOLANT INLET PLENUM DP	360	F4	RS P	H	$ PLENUM, FLOW DIST. IN CYL			586
COOLING BCL	6400	F4	RS P	T G	$ ECCSA4, LOSS-OF-COOLANT & EMERGENCY			330
COORDINATE ANALYSES SEMI-RIGID MOLECULES	ANC	360	F4	RS P	W	$ MMM3,		632
COPYCAT, IBM OS SYSTEM CATALOG UTILITY ROUTINE	ANL	360B	BAL	RSB	X T P	$		646
CORE ACCIDENT ANALYSIS NED	635	F4	RS P	T G	$ FREADM1, FAST REACTOR			479
CORE CONFIGURATION FUEL TEMPERATURE CODE	GGA	7044	F4	RS	I	$ CORE,		233
CORE HEATING CLADDING-STEAM REACTION	ANL	3600	F36	RSBP	G	$ CHEMLOC2,		366
CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	360	F+BAL	RS P	CT H	$ 6KILER,		636
CORE SUPPORT STRESS ANALYSIS	ANL	3600	F36	RS P	T I	$ SUPORAN, REACTOR		357
CORE THERMAL DESIGN STUDY	GGA	7044	F4	RS P	I	$ GAZELLE5, GAS-COOLED		232
CORE TRANSIENT ANALYSIS	ANC	360	F+BAL	RSBPL	CT G	$ PARET, WATER-COOLED		555
CORE, CORE CONFIGURATION FUEL TEMPERATURE CODE	GGA	7044	F4	RS	I	$		233
CORES ANL	360B	F4	RS P	I	$ NUBOW, STRUCTURAL ANALYSIS BOWED REACTOR			643
CORGAM, UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA	KSUN	360	F4	RS P	D	$		390
CORRECTION CALC AI	360	F4	RS P	T Q	$ RESPOND, DISSIMILAR MEDIA TLD			566
COST ANALYSIS AI	7090	F2	RS P	D	$ AIMFIRE, URANIUM FUEL CYCLE			55
COST AND ECONOMICS CWE	360	F4	RS P	T D	$ CINCAS, NUCLEAR FUEL CYCLE			354
COST AND ECONOMICS WAPD	6600	F4	RS P	T D	$ CINCAS, NUCLEAR FUEL CYCLE			354
COST CALCULATION GGA	1108	F4	RS P	T D	$ PWCOST, REACTOR FUEL CYCLE			441
COST CODE HEDL	1108	F5	RS P X	T D	$ PACTOLUS,CLOTHC, NUCLEAR POWER PLANT			540
COST ESTIMATE ORNL	360C	F4	RS P XCT	D	$ CONCEPT3, POWER PLANT CONCEPTUAL			498
COST ESTIMATING ORNL	360B	F4	RS P	T D	$ ORCOST, POWER PLANT CAPITAL			588
COSTS ORNL	1604	F63	RS P	D	$ POWERCO, NUCLEAR STATION ELECTRICITY			340
COSTS UEC	6600	F4	RS P	D	$ POWERCO, NUCLEAR STATION ELECTRICITY			340
COSTS GGA	7044	F4	RS P	T D	$ STMGEN, STEAM GENERATOR DESIGN CRITERIA			227
COSTS PERFORMANCE DATA ANL	360	F4	RS P	D	$ NPRFCCP, FUEL CYCLE			146
COSTS PERFORMANCE DATA UEC	6600	F4	RS P	D	$ NPRFCCP, FUEL CYCLE			146
COSTS PERFORMANCE STUDY GGA	7044	F4	RS P	D	$ WAMPUM, FUEL CYCLE			224
COSTS PERFORMANCE STUDY UEC	6600	F4	RS P	D	$ WAMPUM, FUEL CYCLE			224
COUNTING DATA REDUCTION ANL	3600	F63	RSBP	D	$ COINC, COINCIDENCE			248
COUPLED CHANNEL X-SEC EVALUATION ENEA	360	F4	RS P	CT A	$ JUPITOR1,			308
COUPLED NEUTRON-HYDRODYNAMICS APDA	7094	F2	RS P	F	$ WEAK EXPLOSION,			145
COUPLED NEUTRONICS-HYDRODYNAMICS CODE AGC	7090	F2	RSB	F	$ HATCHET,			153
COUPLED NEUTRONICS-HYDRODYNAMICS SPH PW	1604	F63	RS P	F	$ AX-TNT,			191
COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE CDC	3600	F63	RSBP	F	$ AX1,			102
COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE LLL	7090	F2	RS P	F	$ CONEC,			129
COUPLED-CHANNEL SCATTERING X-SEC CALC KAPL	6600	F4	RS P	T A	$ JP1XR,			506

COUPLED-CHANNEL X-SEC EVALUATION ORNL 1604 F63 RS P T A $ JUPITOR1, 308
CPS, SC4020 PLOTS FROM SCISRS X-SECTION TAPES WANL 7094 F+FAP RSBPL T N $ 239
CRACKING BAPL 6600 F4 RS P I $ STRIPE, FUEL ROD CLAD STRAIN & PELLET 570
CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM AAEC 360 F+BAL RS P T C $ 103
CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM UK-R 7090 F+FAP RSBPL T C $ 103
CRECT,CHECKER, ENDF/B V2 PROCESSING CODES ANL 360 F4 RS P T M $ 475
CRECT,CHECKER,RIGEL,PLOTFB,... ENDF/B V2 PROC BNL 6600B F4 RS T M $ CHECKER, 384
CREEP-BUCKLING OF TUBES UNDER PRESSURE BAPL 6600 F4 RS P I $ TCBU1, 604
CRITERIA COSTS GGA 7044 F4 RS P T D $ STMGEN, STEAM GENERATOR DESIGN 227
CRITICAL ANALYSIS SYSTEM CP 360 F+BAL RS P XCT B $ HAMMER,LITHE,HELP, 277
CRITICAL ASSEMBLY ANALYSIS AI 7600 F4 RS PLX T C $ VIM1, MONTE CARLO 510
CRITICAL ASSEMBLY ANALYSIS AI-A 360 F4 RSBPL CT C $ VIM1X, MONTE CARLO 510
CRITICALITY CODE CRNL 360 F+BAL RSBPL CT C $ KENO, MONTE CARLO MULTIGROUP 450
CRITICALITY CODE DP 360B F+BAL RSBP CT C $ KENO2, MONTE CARLO MULTIGROUP 450
CRITICALITY CODE RFD 6600 F+COM RS PLX T C $ KENO2, MONTE CARLO MULTIGROUP 450
CRITICALITY SAFETY DP 360 F4 RS P T C $ KEFF,MGBS,TGAN, NUCLEAR 617
CRNL 6600 F4 RS P P $ FORSIM, SOLN OF SYSTEM OF ORDINARY DIFF EQNS 514
CROCK, SPACE POWER PLANT DESIGN OPTIMIZATION AI 7090 F2 RS I $ 112
CROC90, ML-1 FLUID FLOW EXPERIMENT ANALYSIS AGC 7090 F2 RS P C $ 154
CROSS SECTIONS LASL 6600 F4 RS P N $ LARCA, FLUX-WEIGHTING OF DTF4 409
CROSS-SPECTRAL DENSITIES BNW 1108 F5 RS P X T F $ NOISY1, AUTO- AND 488
CROSS-SPECTRAL DENSITIES BNW 7090 F4 RS P T F $ NOISY1, AUTO- AND 488
CROSSPLOT, SC4020 PLOTS FROM X-SECTION TAPES GGA 7044 F+SPS RSBP T N $ 207
CRYSTAL MTS 7090 MAD RSB O $ BURP5, GAMMA-RAY PHOTOFRACTION WELL 170
CRYSTAL MTS 7090 MAD RSB O $ BURP4, GAMMA-RAY PHOTOFRACTION SOLID 169
CRYSTALLINE MATERIALS LASL 6600 F4 RS P T A $ TCR, THERMAL SCATTERING 366
CRYSTALLINE SCATTERING KERNEL CALC GGA 7090 F2 RS T A $ SUMMIT, 56
CSP1, SN X-SECTION LIBRARY TAPE PREPARATION PW 1604 F63 RS L $ 194
CSP2A, SN X-SECTION LIBRARY TAPE PREPARATION PW 1604 F63 RS L $ 193
CURFIT, CURVE FITTING EXPERIMENTAL DATA POINTS KAPL 6600 F+ASC RS P T P $ 43
CURIE,DOSE,THUNDERHEAD, EXTERNAL+INTERNAL DOSE AI 7094 F+FAP RS PL T G $ 196
CURVE FITTING LASL 7094 F4 RS T P $ LASL LEAST SQUARES, GENERAL 62
CURVE FITTING BAPL 6600 F4 RS P T P $ M0661,M0657,M0626, POLYNOMIAL 411
CURVE FITTING EXPERIMENTAL DATA POINTS KAPL 6600 F+ASC RS P T P $ CURFIT, 43
CURVE PLOT KAPL 6600 F+ASC RS P T P $ SNEQ, NONLINEAR ALGEBRAIC EQN SOLN 364
CURVES LLL 7094 F2 RS P P $ EXPALS, LEAST SQUARES EXPONENTIAL DECAY 321
CWE 360 F4 RS P T D $ CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS 354
CYCLE ANALYSIS AI 7094 F2 RS PL T I $ CYCLOPS1, THERMODYNAMIC 244
CYCLE ANALYSIS FOR FAST REACTORS ANL 360 F+BAL RSBPL CT D $ REBUS2, FUEL 634
CYCLE ANALYSIS PARTIAL REFUEL GGA 7044 F4 RS P T D $ GARGOYLE, FUEL 260
CYCLE ANALYSIS W/REFUELING GGA 7044 F4 RS P T D $ REVISED-GAD, FUEL 223
CYCLE CALCULATION GGA 1108 F4 S T D $ GAFFE, EQUILIBRIUM FUEL 302
CYCLE COST ANALYSIS AI 7090 F2 RS P D $ AIMFIRE, URANIUM FUEL 55
CYCLE COST AND ECONOMICS CWE 360 F4 RS P T D $ CINCAS, NUCLEAR FUEL 354
CYCLE COST AND ECONOMICS WAPD 6600 F4 RS P T D $ CINCAS, NUCLEAR FUEL 354
CYCLE COST CALCULATION GGA 1108 F4 RS P T D $ FWCOST, REACTOR FUEL 441
CYCLE COSTS PERFORMANCE DATA ANL 360 F4 RS P D $ NPREOCP, FUEL 146
CYCLE COSTS PERFORMANCE DATA UEC 6600 F4 RS P D $ NPREOCP, FUEL 146
CYCLE COSTS PERFORMANCE STUDY GGA 7044 F4 RS P D $ WAMPUM, FUEL 224
CYCLE COSTS PERFORMANCE STUDY UEC 6600 F4 RS P D $ WAMPUM, FUEL 224
CYCLE ECONOMICS UICS 360 F4 RS P CT D $ GEM, ANALYSIS OF NUCLEAR FUEL 576
CYCLE PARAMETERS FAST BREEDERS NED 635 F4 RS P D $ RAPFU, FUEL 372
CYCLOPS1, THERMODYNAMIC CYCLE ANALYSIS AI 7094 F2 RS PL T I $ 244
CYGRO2, STRESS ANALYSIS CYL FUEL ELEMENT BAPL 6600 F4 RS T I $ 266
CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION BAPL 6600 F4 RS P T I $ 449
CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION TVA 360 F4 RS P T I $ 449
CYL CRNL 7090 F2 RS P T C $ EQUIPOISE3, 2-D 2-GROUP DIFFUSION SLAB 39
CYL CELL CODE AND TEMPEST COMBINATION AI 7090 F2 RS P B $ BAM, S4 108
CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION AI 7090 F2 RS B $ S4 53
CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION CDC 1604 F63 RS P B $ S4 53
CYL COOLANT INLET PLENUM DP 360 F4 RS P H $ PLENUM, FLOW DIST. IN 586
CYL FUEL ELEMENT BAPL 6600 F4 RS T I $ CYGRO2, STRESS ANALYSIS 266
CYL FUEL ELEMENTS AEB 360 F4 RS P B $ WELWING, MATERIAL BUCKLING 362

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CYL GGA  1108  F+BAL RS P   T C $ GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH,     430
CYL LATTICE   TVA   360  F4     RSBPLXCT B $ LASER, SPECTRUM CALC WITH BURNUP    249
CYL LATTICE   WAPD 7094  F+MAP RS PLX T B $ LASER, SPECTRUM CALC WITH BURNUP     249
CYL PW   1604  F63   RS     T C $ 2DXYL, 3-D MULTI-GP FLUX SYNTHESIS PROGRAM     192
CYL SHELL BUCKLING COLLAPSE ANALYSIS    BAPL 6600  F4    RS P   T I $ BUSHL,     481
CYL SPHERE    BNW  1107  F4    RS P   T C $ HFN, 1-D MULTI-GP DIFFUSION SLAB     241
CYL SPHERE    AI   7090  F+FAP RS  L  T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB     120
CYL SPHERE    AI   7090  F+FAP RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB      29
CYL SPHERE    CDC  1604  F63   RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB      29
CYL SPHERE    CDC  1604  F63   RS PLX T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB     120
CYL SPHERE    CSUC  370  F4    RS PL CT C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB      29
CYL SPHERE  AI   7090  F+FAP RS  L  T C $ ULCER, 1-D MULTI-GP DIFFUSION SLAB     118
CYL SPHERE  ANL  3600  F36   RS P X T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB     262
CYL SPHERE  MTS   360  F4    RSBPLXCT C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB     262
CYL SPHERE  PURD 6500  F4    RS PLX T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB     262
CYL SPHERE  PW   1604  LAG1  RS P     C $ MGDSN, 1-D MULTI-GP SN APPROX SLAB     211
CYL SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN, 1-D MULTI-GP SN APPROX SLAB     132
CYL SPHERE BHSC  360  F4    RS P   T C $ FAIMOS, 1-D MULTI-GP DIFFUSION SLAB     120
CYL SPHERE GEOM  AI   7090  F2    RS P     J $ GRACE2, GAMMA-RAY ATTENUATION      46
CYL SPHERE GEOM  CDC  1604  F63   RS P     J $ GRACE2, GAMMA-RAY ATTENUATION      46
CYL, SPH  ANC   360  F4    RSBP  CT C $ MONA, 1-D MULTIGROUP DIFFUSION SLAB,     582
CYLINDER      ANL  3600  F63   RSBP   T H $ ARGUS, TRANSIENT TEMPERATURE CALC     152
CYLINDER      PPCO 7040  F4    RS P   T C $ TOPIC, 1-D FEW-GP SN APPROXIMATION    148
CYLINDER      PPCO 7090  F2    RS P   T C $ TOPIC, 1-D FEW-GP SN APPROXIMATION    148
CYLINDER CDC  1604  F63   RS P   T C $ 2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB      40
CYLINDER ORNL 7090  F2    RS P   T C $ 2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB      40
CYLINDER SLAB  CDC  1604  F63   RS P   T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION     87
CYLINDER SLAB  ORNL 7090  F2    RS P   T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION     87
CYLINDER SPHERE  AEB   360  F4    RS  L  T C $ FIRE5, 1-D AGE-DIFFUSION SLAB       9
CYLINDER SPHERE AI   7090  F2    RS P   T C $ FOG, 1-D FEW-GP DIFFUSION SLAB      28
CYLINDER SPHERE BC    625  F4    RS     T C $ FOG, 1-D FEW-GP DIFFUSION SLAB      28
CYLINDER SPHERE CDC  1604  F63   RS P   T C $ FOG, 1-D FEW-GP DIFFUSION SLAB      28
CYLINDRICAL PINS ANC   360  F4    RSBP  CT J $ VIEWPIN, VIEW FACTOR CALC FOR     569
DAC  7090  F2    RSBP     J $ LIPRECAN1, MC NEUTRON PENETRATION CALCULATION     123
DAC1, SN PERTURBATION CODE USING DTF4 FLUXES    LASL 6600  F4    RS P     N $    455
DAFT1, LEAST SQUARES FIT FISSILE NUCLIDE DATA  BAPL 6600  F4    RS P   T P $     327
DAMAGE IN METALS    GEC   635  F+FAP RSBP   T O $ CASCADE,CLUSTER, RADIATION     419
DAMMET,PLOTFB,... ENDF/B V1 PROC BNL  6600B F4    RS     T M $ CHECKER,CRECT,     384
DANCOFF JR, MODERATOR SPACE CHORD DIST FUNCT   AEG  7090  F2    RS       B $     150
DATA      WAPD 7600  F4    RS P   T B $ ETOT2, THERMAL LIBRARIES FROM ENDF/B     509
DATA      ANL   360  F4    RS P     D $ NPRFCCP, FUEL CYCLE COSTS PERFORMANCE    146
DATA      UEC  6600  F4    RS P     D $ NPRFCCP, FUEL CYCLE COSTS PERFORMANCE    146
DATA  NED   635  F4    RS P   T D $ EXPN, ANALYSIS OF PULSED NEUTRON SOURCE     258
DATA  BAPL 6600  F4    RS P   T B $ EPOCH, NEUTRON AGE CALCULATION OF ENDF/B    461
DATA  BAPL 6600  F4    RS P   T P $ DAFT1, LEAST SQUARES FIT FISSILE NUCLIDE    327
DATA  DP   360B F4    RS P XCT A $ FLANGE2(71-1), ENDF/B THERMAL SCATTERING     368
DATA  ORNL  360  F4    RS P   T B $ RICE, PRIMARY RECOIL ATOM SPECTRA ENDF/B    453
DATA AI   7094  F+MAP RS P     A $ CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST     215
DATA ANALYSIS      ANC   360  F4    RS PL CT M $ ERREST, LOCA RCD BUNDLE CHF     518
DATA ANALYSIS   CNEA  360  F4    RS P     E $ TRIFIDO, PULSED NEUTRON SOURCE     489
DATA ANALYSIS   GEES 1108  F5    RS P   T O $ CAGE,BIRD,SPEC, TIME-OF-FLIGHT     476
DATA ANALYSIS BAPL 6600  F4    RS P     P $ BH99, EXTREME VALUE DISTRIBUTION    621
DATA CONVERSION           ANL   360  F4    RS P  CT M $ ETOE, ENDF/B TO MC**2     350
DATA CONVERSION           APCA 3600  ASAF4 RS P   T M $ ETOE, ENDF/B TO MC**2     350
DATA FILE SERVICE ROUTINES ENDF TAPES    BNL  7090  F+FAP RS P   T M $ DFSR,     236
DATA GESV  635  F+GMP RS P XCT B $ ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B     501
DATA HEAT TRANSFER STUDY SLL  6600  F4    RS P     N $ HEATMESH, GEOMETRICAL     434
DATA LASL 6600  F4    RS P   T B $ GLEN, GROUP CONSTANT CALC FROM TOR OUTPUT     361
DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2    WAPD 6600  BCD   R   L  T Z $ ETOG1     447
DATA LIBRARY      LLL  7094  F+FAP RS PL  T M $ ECSIL, EXPERIMENTAL NEUTRON      351
DATA MANAGEMENT, EDITING, & ANALYSIS    BAPL 6600  F4    RS P   T M $ SHLOG,     557
DATA POINTS KAPL 6600  F+ASC RS P   T P $ CURFIT, CURVE FITTING EXPERIMENTAL      43
DATA PREPARATION FOR 2-D DESIGN PROGRAMS  LASL 7090  F+FAP RS P   T L $ DPC,     234
DATA PROCESSING CODE           ANL   360  F4    RS     T M $ RIGEL, ENDF/B V3     571
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DATA                                                                    DESIGN

DATA PROCESSING MODULE   ANL   360  F4    RSBP  CT L $ ARC-NUI002, BCD INPUT     533
DATA REDUCTION     ANL  3600  F63   RSBP     O $ CCINC, CCINCIDENCE COUNTING    248
DATA STORAGE, RETRIEVAL, AND DISPLAY   DP    360  F+BAL  S     T M $ JOSHUA,     490
DATA SYSTEM  KAPL 6600B F+CCM R       T M $ DATATRAN, MODULAR PROGRAMMING AND   386
DATA TAPES   GGA  1108  BIN   R   L  T Z $ ZPR-III ASSEMBLY 48 GAFGAR ENDF/B     356
DATA TO THERMAL LIBRARY FORM  WAPD 7600  F4    RS P   T B $ ETOT3, ENDF/B V3     628
DATA UILL  360  F4    RS P     A $ CODILLI, LEAST SQUARES ANALYSIS RESONANCE     347
DATATRAN UTILITY MODULES, 2-D + 3-D PLOTTING   KAPL 6600  F+ASC RS P   T P $     407
DATATRAN UTILITY MODULES, 2-D & 3-D PLOTTING   KAPL 6600B F+ASC R       T P $     407
DATATRAN 2-D GEOMETRY INPUT, PREPARATION, EDIT KAPL 6600E F+ASC R       T L $     406
DATATRAN, MODULAR PROGRAMMING AND DATA SYSTEM  KAPL 6600B F+COM R       T M $     386
DBF1, RESONANCE INTEGRAL HEX CELL  BAPL 6600  F+ASC RS P X T B $ RESC2,RESOO,     285
DBUFIT1, LEAST SQUARES TRANSMUTATION ANALYSIS  BNW  1108  F5    RS P   T D $     456
DDB, 2-D FEW-GP DIFFUSION BURNUP RZ GEOMETRY   GGA  7090  F+FAP RSBP   T C $      99
DE/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS SLA   360  F4    RS P X T P $     640
DE/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS SLA  6600  F4    RS P X T P $     640
DECAY      BNW  1108  F5    RSBPL  T D $ ISOGEN, RADIONUCLIDE GENERATION AND     367
DECAY CHAIN ANALYSIS        ORNL 1604  F63   RS P     D $ ISOCRUNCH, REACTION     180
DECAY CHAIN ANALYSIS        ORNL 7090  F2    RSBP     D $ ISOCRUNCH, REACTION     180
DECAY CHAINS   GEC   635  F4    RSBP     D $ CHAINS, ANALYSIS OF RADIOACTIVE      418
DECAY CURVES LLL  7094  F2    RS P     P $ EXPALS, LEAST SQUARES EXPONENTIAL     321
DECAY ORNL 1604  F63   RS P     D $ ISOTOPES, MAXIMUM YIELD FROM REACTION OR      179
DEFLECTION CALCULATION PARALLEL BEAMS    ANL  3600  F36    SBP     I $ BOW2,       365
DEFLECTION STRESS STUDY BAPL 6600  F+COM RS P   T I $ GAPL2, INELASTIC LARGE      397
DEFORMATION    BAPL 6600  F4    RS P   T I $ CYGRO3, OXIDE FUEL ROD STRESS &      449
DEFORMATION    TVA   360  F4    RS P   T I $ CYGRO3, OXIDE FUEL ROD STRESS &      449
DEFORMATION   BAPL 6600  F4    RS P   T I $ PELEN, FUEL PELLET TEMPERATURE &     598
DENSITIES      BNW  1108  F5    RS P X T F $ NOISY1, AUTO- AND CROSS-SPECTRAL     488
DENSITIES      BNW  7090  F4    RS P   T F $ NOISY1, AUTO- AND CROSS-SPECTRAL     488
DENSITY CALC  AI   7094  F+FAP RS PL  T B $ TYCHE3, MONTE CARLO SLOWING-DOWN      149
DEPLETION      AI    360  F4    RSBP X T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION      58
DEPLETION      AI   7090  F2    RS  L  T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION      58
DEPLETION      CDC  1604  F63   RS  L  T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION      58
DEPLETION      KAPL 6600  F4    RS P   T D $ 3DXT,DEP3, 3-D XENON TRANSIENT &     477
DEPLETION      LASL 7030  F4    RS P   T D $ DTF-BURN, 1-D MULTI-GP DTF4 WITH     269
DEPLETION     AERI 6600         RSBPLX T B $ LEOPARD, SPECTRA CALCULATION WITH    279
DEPLETION      ANC   360F F+BAL RS P XCT D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION    275
DEPLETION      ANL  3600  F4    RSBP   T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND     325
DEPLETION      BAPL 6600A F+ASC RS P   T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION    275
DEPLETION      BAPL 6600C F+ASC RS P   T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION    275
DEPLETION      BCS  6600D F+ASC R B    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION    275
DEPLETION      BNW  1108  F4    RS P   T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND     325
DEPLETION      BW   6600B F+ASC RS P   T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION    275
DEPLETION      IBM   360A F+BAL RS P   T D $ PDQ5, 2-D FEW-GROUP DIFFUSION AND    336
DEPLETION      JNC  1108  F5    RS  LX T B $ LEOPARD, SPECTRA CALCULATION WITH    279
DEPLETION      LASL 6600  F4    RS P   T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND     325
DEPLETION      MIT   360B F+BAL RSBP   T D $ PDQ5, 2-D FEW-GROUP DIFFUSION AND    336
DEPLETION      WAPD  360  F4    RS PLXCT B $ LEOPARD, SPECTRA CALCULATION WITH    279
DEPLETION   GGA  7044  F4    RS P   T D $ RELOAD-FEVER, 1-D FEW-GP DIFFUSION     221
DEPLETION CODE ORNL 7090  F+FAP RS P   T D $ ASSAULT, 2-D MULTI-GP DIFFUSION     240
DEPLETION FISSION PRODUCT  BAPL 6600  F4    RS P     D $ CINDER,MO102, POINT     313
DEPLETION FISSION PRODUCT  DP    360  F+BAL RS P   T D $ CINDER,MO102, POINT     313
DEPLETION GGA  1108  F4    RS P   T D $ FEVER7, 1-D MULTIGROUP DIFFUSION AND     318
DEPLETION GGA  1108  F4    RS P   T D $ GAUGE, 2-D FEW-GP HEX GEOM DIFFUSION     339
DEPLETION MULTIGP  ORNL  360F F4    RS P   T K $ CITATION, 1,2,3-D DIFFUSION      387
DEPLETION NED   635  F+GMP RS P   T D $ SYN, 2D SYNTHESIS MULTIGP DIFF & 1GP     495
DEPLETION PROGRAM  ANC   360  F4    RSBP   CT D $ DWARF, 1-D FEW-GP DIFFUSION    579
DEPLETION PROGRAM  GGA  7090  F2    RSB    T D $ FEVER, 1-D FEW-GP DIFFUSION     117
DEP3, 3-D XENON TRANSIENT & DEPLETION     KAPL 6600  F4    RS P   T C $ 3DXT,    477
DESIGN   BNW  1108  F5    RS P   T H $ REPP, THERMAL-HYDRAULIC WATER REACTOR    483
DESIGN & SURVEY STUDY  BW   6600  F+COM RS P X T D $ FARED, 1-D FAST REACTOR     427
DESIGN CRITERIA COSTS  GGA  7044  F4    RS P   T D $ STMGEN, STEAM GENERATOR     227
DESIGN MLMO  360  F4    RSBP  C  P $ LATIN SQ, NXN LATIN SQUARE EXPERIMENTAL     630
DESIGN MULTIGROUP SLAB GEOMETRY    ANL  3600  F63   RSBPL  T J $ MAC, SHIELD     143
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DESIGN MULTIGROUP SLAB GEOMETRY    BNW  7090  F2    RSBPL  T J $ MAC, SHIELD      143
DESIGN OPTIMIZATION   AI   7090  F2    RS        I $ CROCK, SPACE POWER PLANT    112
DESIGN OPTIMIZATION   AI   7090  F2    RS        I $ SHCCK, SPACE POWER PLANT    114
DESIGN PROGRAMS  LASL 7090  F+FAP RS P    T L $ DPC, DATA PREPARATION FOR 2-D   234
DESIGN STUDY    PW   1604  F63   RS P    T I $ PIP, CENTRIFUGAL PUMP IMPELLER  187
DESIGN STUDY GGA  7044  F4    RS P     I $ GAZELLE5, GAS-CCOLED CORE THERMAL  232
DESIGN SYSTEM    AI    360  F4    RSBP   T K $ THREDES, 1-C FEW-GP DIFFUSION   273
DESIGN SYSTEM LASL 6600  F+CCM RS P   T P $ LENSDES, NONLINEAR LEAST SQ LENS  602
DESK CALCULATOR FORM SHEET OP PACKAGE   KAPL 6600  F+ASC RS P   T P $ DOGGY,  428
DETECTOR EFFICIENCY DISK SCURCE         MTS  7090  MAD   RSB      O $ BURP2,  165
DETECTOR EFFICIENCY POINT SCURCE        MTS  7090  MAD   RSB      O $ BURP1,  164
DETECTOR EFFICIENCY POINT SCURCE        MTS  7090  MAD   RSB      O $ BURP3,  166
DFSR, DATA FILE SERVICE ROUTINES ENDF TAPES    BNL  7090  F+FAP RS P   T M $  236
DIELECTRICS SLA  6600  F4    RS P     V $ FFEARS, LAPLACE EQUATION ISOTROPIC 577
DIFF & IGP DEPLETION NED   635  F+GMP RS P   T D $ SYN, 2D SYNTHESIS MULTIGP  495
DIFF EQNS   CRNL 6600  F4    RS P     P $ FCRSIM, SCLN OF SYSTEM OF CRDINARY 514
DIFF EQUATIONS SLA   360  F4    RS P X T P $ DE/STEP,INTRP, SCLN CF CRDINARY 640
DIFF EQUATIONS SLA  6600  F4    RS P X T P $ DE/STEP,INTRP, SCLN CF CRDINARY 640
DIFFERENTIAL EQN SYSTEM SOLVER  ANL   360B F4    RS P  C  P $ GEAR, CRDINARY 592
DIFFERENTIAL EQN SYSTEM SOLVER  LLL  6600B F4    RS P     P $ GEAR, CRDINARY 592
DIFFERENTIAL FQNS. SOLUTION  KAPL 6600  F+ASC RS P   T P $ LIZARD, NONLINEAR 445
DIFFRACTION MODEL ELASTIC SCAT X-SEC   BNL  6600  F4    RS P     A $ BESFIT, 524
DIFFRACTION POWDER PATTERN INDEXING LASL 6600  F+COM RS P   T G $ INDX, XRAY 609
DIFFUSION          ANL   360  F4    RS P     F $ TWIGGLE, 2-D 2-GP SPACE-TIME 338
DIFFUSION      UMCC  360  F4    RS P   T C $ VARI-QUIR, TIME-DEP 2-D MULTI-GP 212
DIFFUSION      WANL 6600  F4    RS P   T C $ VARI-QUIR, TIME-DEP 2-D MULTI-GP 212
DIFFUSION + LIB   AI   360  F4    RSBPLX T C $ CAESAR4,LIBLST, 1-D MULTI-GP 270
DIFFUSION & BURNUP XY, RZ GGA  1108  F+BAL RS P   T D $ BUG2, 2-D MULTIGROUP 438
DIFFUSION & INVENTORY  ANL   360  F4    RSBP  CT C $ ABC-CIF1D, 1-D MULTI-GP 626
DIFFUSION & SN THEORY  NED   635  F4    RS P   T C $ DOT2DB, 2-D MULTIGROUP 459
DIFFUSION ABSORPTION REMOVAL X-SECS BAPL 6600  F4    RS      T B $ MOBO7, 2-D 280
DIFFUSION AND DEPLETION    ANL  3600  F4    RSBP   T D $ 2DB, 2-D MULTIGRCUP 325
DIFFUSION AND DEPLETION    BNW  1108  F4    RS P   T D $ 2DB, 2-D MULTIGRCUP 325
DIFFUSION AND DEPLETION    IBM   360A F+BAL RS P   T D $ PDQ5, 2-D FEW-GROUP 336
DIFFUSION AND DEPLETION    LASL 6600  F4    RS P   T D $ 2DB, 2-D MULTIGRCUP 325
DIFFUSION AND DEPLETION    MIT   360B F+BAL RSBP   T D $ PDQ5, 2-D FEW-GROUP 336
DIFFUSION AND DEPLETION GGA  1108  F4    RS P   T D $ FEVER7, 1-D MULTIGRCUP 318
DIFFUSION BURNUP ANALYSIS  ANL   360  F4    RS P  CT D $ 3DB, 3-D MULTIGRCUP 567
DIFFUSION BURNUP ANALYSIS  HEDL 1108  F4    RS P   T D $ 3DB, 3-D MULTIGRCUP 567
DIFFUSION BURNUP REFUELING HISTORY  LASL 6600  F4    RS P   T D $ PHENIX, 2D 454
DIFFUSION BURNUP RZ GEOMETRY   GGA  7090  F+FAP RSBP   T C $ DDB, 2-D FEW-GP  99
DIFFUSION CALC    KAPL 6600  F4    RS P     F $ RAUMZEIT, 1-D TIME-DEPENDENT 352
DIFFUSION CALC HEX-Z MESH      GGA  1108  F4    RS P   T C $ GATT, 3-D FEW-GP 380
DIFFUSION CYLINDER SLAB  CDC  1604  F63   RS P   T C $ ECUIPOISE3A, 2-D 2-GP  87
DIFFUSION CYLINDER SLAB  ORNL 7090  F2    RS P   T C $ ECUIPOISE3A, 2-D 2-GP  87
DIFFUSION DEPLETION      AI   360  F4    RSBP X T D $ SIZZLE, 1-D MULTIGRCUP  58
DIFFUSION DEPLETION      AI  7090  F2    RS  L  T D $ SIZZLE, 1-D MULTIGRCUP  58
DIFFUSION DEPLETION      CDC  1604  F63   RS  L  T D $ SIZZLE, 1-D MULTIGRCUP  58
DIFFUSION DEPLETION     ANC   360F F+BAL RS P XCT D $ PDQ7, 1,2 CR 3-D FEW-GP 275
DIFFUSION DEPLETION     BAPL 6600A F+ASC RS P   T D $ PDQ7, 1,2 CR 3-D FEW-GP 275
DIFFUSION DEPLETION     BAPL 6600C F+ASC RS P   T D $ PDQ7, 1,2 CR 3-D FEW-GP 275
DIFFUSION DEPLETION     BCS  6600D F+ASC R B    T D $ PDQ7, 1,2 CR 3-D FEW-GP 275
DIFFUSION DEPLETION     BW   6600B F+ASC RS P   T D $ PDQ7, 1,2 CR 3-D FEW-GP 275
DIFFUSION DEPLETION    GGA  7044  F4    RS P   T D $ RELCAD-FEVER, 1-D FEW-GP 221
DIFFUSION DEPLETION CODE ORNL 7090  F+FAP RS P   T D $ ASSAULT, 2-D MULTI-GP 240
DIFFUSION DEPLETION GGA  1108  F4    RS P   T D $ GAUGE, 2-D FEW-GP HEX GEOM 339
DIFFUSION DEPLETION MULTIGP  ORNL  360H F4    RS P   T K $ CITATION, 1,2,3-D 387
DIFFUSION DEPLETION PROGRAM  ANC   360  F4    RSBP  CT D $ DWARF, 1-D FEW-GP 579
DIFFUSION DEPLETION PROGRAM  GGA  7090  F2    RSB    T D $ FEVER, 1-D FEW-GP 117
DIFFUSION DESIGN SYSTEM    AI   360  F4    RSBP   T K $ THREDES, 1-D FEW-GP 273
DIFFUSION FAST X-SECTION GENERATION   BNW  1108  F4    RS F X T B $ IDX, 1-D 374
DIFFUSION FEEDBACK  BAPL 6600  F4    RS P   T F $ TWIGL, 2-D 2-GP SPACE-TIME 338
DIFFUSION FEEDBACK BNL  6600  F4    RS P   T F $ NOAH, 1-D ONE-GP SPACE-TIME 405
DIFFUSION MIT   370  F4    RS P   T F $ GAKIN2, 1D MULTIGRCUP TIME-DEPENDENT 310
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DIFFUSION POWER DIST SEARCH  GGA  7044  F4     RS P   T C $ GASP2, 1-D FEW-GP     220
DIFFUSION PROGRAM    AAEC  360  F+BAL RS P    T C $ CRAM, 1-D AND 2-D MULTI-GP   103
DIFFUSION PROGRAM    ORNL 7090  F+FAP RS P    T C $ EXTERMINATOR, 2-D MULTI-GP   156
DIFFUSION PROGRAM    UK-R 7090  F+FAP RSBPL   T C $ CRAM, 1-D AND 2-D MULTI-GP   103
DIFFUSION PROGRAM  BC    625  F4     RS      T C $ EXTERMINATOR2, 2-D MULTI-GP   156
DIFFUSION PROGRAM  CE   6600  F4     RS P    T C $ EXTERMINATOR2, 2-D MULTI-GP   156
DIFFUSION PROGRAM  ORNL  360  F4     RS P    T C $ EXTERMINATOR2, 2-D MULTI-GP   156
DIFFUSION SLAB CYL      ORNL 7090  F2     RS P    T C $ EQUIPOISE3, 2-D 2-GROUP    39
DIFFUSION SLAB CYL SPHERE    BNW  1107  F4     RS P    T C $ HFN, 1-D MULTI-GP    241
DIFFUSION SLAB CYL SPHERE    AI   7090  F+FAP RS  L   T C $ FAIM, 1-D MULTI-GP    120
DIFFUSION SLAB CYL SPHERE    AI   7090  F+FAP RS PL   T C $ AIM6, 1-D MULTI-GP     29
DIFFUSION SLAB CYL SPHERE    CDC  1604  F63    RS PL   T C $ AIM6, 1-D MULTI-GP     29
DIFFUSION SLAB CYL SPHERE    CDC  1604  F63    RS PLX T C $ FAIM, 1-D MULTI-GP    120
DIFFUSION SLAB CYL SPHERE    OSUC  370  F4     RS PL CT C $ AIM6, 1-D MULTI-GP     29
DIFFUSION SLAB CYL SPHERE    AI   7090  F+FAP RS  L   T C $ ULCER, 1-D MULTI-GP    118
DIFFUSION SLAB CYL SPHERE    ANL  3600  F36    RS P X T C $ MACH1, 1-D MULTI-GP    262
DIFFUSION SLAB CYL SPHERE    MTS   360  F4     RSBPLXCT C $ MACH1, 1-D MULTI-GP    262
DIFFUSION SLAB CYL SPHERE    PURD 6500  F4     RS PLX T C $ MACH1, 1-D MULTI-GP    262
DIFFUSION SLAB CYL SPHERE BHSC  360  F4     RS P    T C $ FAIMOS, 1-D MULTI-GP    120
DIFFUSION SLAB CYLINDER CDC  1604  F63    RS P    T C $ 20GRAND, 2-D FEW-GROUP     40
DIFFUSION SLAB CYLINDER ORNL 7090  F2     RS P    T C $ 20GRAND, 2-D FEW-GROUP     40
DIFFUSION SLAB CYLINDER SPHERE AI   7090  F2     RS P    T C $ FOG, 1-D FEW-GP     28
DIFFUSION SLAB CYLINDER SPHERE BC    625  F4     RS      T C $ FOG, 1-D FEW-GP     28
DIFFUSION SLAB CYLINDER SPHERE CDC  1604  F63    RS P    T C $ FOG, 1-D FEW-GP     28
DIFFUSION SLAB, CYL, SPH  ANC   360  F4     RSBP  CT C $ MONA, 1-D MULTIGROUP    582
DIFFUSION SLAB, SPH, CYL GGA  1108  F+BAL RS P    T C $ GAZFE2, 1-D MULTIGROUP    430
DIFFUSION SYNTHESIS CALC   NED   635  F4     RS PL   T C $ BISYN, 2-D MULTI-GP    287
DIFFUSION SYNTHESIS CALC   NED  1108  F4     RS P    T C $ BISYN, 2-D MULTI-GP    287
DIFFUSION TEMP COEF CALC     GGA  7044  F4     RS P    T C $ TEMCO, 1-D FEW-GP    225
DIFFUSION TRIANGULAR MESH  GGA  1108  F+BAL RS P    T C $ GAMTRI, 2-D MULTIGP    401
DIFFUSION XY RZ GEOMETRY GGA  1108  F+BAL RS P    T C $ GAMBLE5, 2-D MULTI-GP    222
DIFFUSION XY RZ GEOMETRY GGA  7044  F+MAP RSBP    T C $ GAMBLE4, 2-D MULTI-GP    222
DIFFUSION XY RZ RTH   WANL 7094  F4     RS P X T C $ VARI-CLIR3, 2-D MULTI-GP    264
DIFFUSION XYZ GEOMETRY  CDC  1604  F63    RS P    T C $ WHIRLAWAY, 3-D 2-GROUP     32
DIFFUSION XYZ GEOMETRY  ORNL 7090  F2     RS P    T C $ WHIRLAWAY, 3-D 2-GROUP     32
DIFFUSION XYZ R-THETA-Z   LASL 6600  F4     RS P    T C $ 3DDT, 3-D MULTIGROUP    463
DIFFUSION 3-GEOM    BAPL 6600  F4     RS P    T F $ WIGL2, 1-D 2-GF SPACE-TIME    274
DIFFUSION 3-GEOM     GGA  1108  F4     RS P    T F $ WIGL2, 1-D 2-GF SPACE-TIME    274
DIFFUSION+BURNUP TRI-MESH  GGA  1108  F+BAL RS P    T D $ BLGTRI, 2-D MULTIGP    439
DISASSEMBLY   ANL   360  F4     RS P XCT F $ VENUS, 2-D LMFBR POWER EXCURSION    511
DISCHARGE STUDY   HEDL 1108  F5     RS P    T R $ TOPLYP2, POWER PLANT THERMAL    599
DISCRETE ORDINATE CALC       AI   7090  F2     RS PLX T C $ CTF2, 1-D MULTI-GP    151
DISCRETE ORDINATE CALC       AI    360  F4     RSBPLX T C $ ANISN, 1-D MULTI-GP    151
DISCRETE ORDINATE CALC       UNC  1604  F63    RS PL   T C $ CTF, 1-D MULTIGROUP    144
DISCRETE ORDINATE CALC  ANL  3600  F36    RS P    T C $ SNARC-1D, 1-D MULTI-GP    288
DISCRETE ORDINATE CODE       GGA  1108  F5     RS P    T C $ 2DF, 2-D MULTI-GP    173
DISCRETE ORDINATE CODE       UNC  1604  F63    RS      C $ 2DF, 2-D MULTI-GP    173
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DISCRETE ORDINATE PROGRAM   BC    625  F+MAP RS P    T C $ CTF4, 1-D MULTI-GP    209
DISCRETE ORDINATE PROGRAM   LASL 6600  F4     RS P    T C $ CTF4, 1-D MULTI-GP    209
DISCRETE ORDINATE PROGRAM   LASL 7030  F4     RS P    T C $ CTF4, 1-D MULTI-GP    209
DISCRETE ORDINATE PROGRAM   LER  7094  F4     RS P    T C $ CTF4, 1-D MULTI-GP    209
DISCRETE ORDINATE PROGRAM LER  7090  F+MAP RS P    T C $ TOSN, 2-D MULTIGROUP    312
DISCRETE ORDINATES SLAB GEOMETRY  BAPL 6600  F4     RS P    T C $ BE21, FEW-GP    398
DISCRETE-ELEMENT ANALYSIS THIN SHELLS  MIT   360  F4     RS P    T I $ SABOR4,    402
DISK SOURCE          MTS  7090  MAD   RSB      D $ BURP2, DETECTOR EFFICIENCY    165
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DOS-MFT REMOTE WORKSTATION PKG ANL 360B F+ASM RSB CT P $ WSP-HASP/DCS, 541
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DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM LASL 6600 F4 RS P T C $ 209
DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM LASL 7030 F4 RS P T C $ 209
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DUKE POWER MCGUIRE UNITS DUCO 635 F4 RS G $ ANVENT, LOCA ANALYSIS 529
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DYNAMICS        BAPL 6600  F4     RS P   T I $ MO266, LINEAR ELASTIC STRUCTURAL     383
DYNC1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION   ANL   360  F4     RS P     O $      464
DYNC1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION   KAPL 6600  F4     RS P     C $      464
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ECC   BCL  6400  F4    RS P X T G $ MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS       508
ECCSA4, LOSS-OF-COOLANT & EMERGENCY COOLING    BCL  6400  F4     RS P   T G $      330
ECONOMICS  CWE   360  F4     RS P   T D $ CINCAS, NUCLEAR FUEL CYCLE COST AND       354
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EDITOR, ENDF/B TAPE PROCESSING AND EDITING      ORNL 6600  F4     RS P   T M $     502
EFFECTIVE X-SECTION CALC FROM DSN OUTPUT  PW    1604  LAG1  RS P     N $ DTX,       210
EFFICIENCY DISK SOURCE          MTS  7090  MAD   RSB       O $ BURP2, DETECTOR       165
EFFICIENCY POINT SOURCE         MTS  7090  MAD   RSB       C $ BURP1, DETECTOR       164
EFFICIENCY POINT SOURCE         MTS  7090  MAD   RSB       O $ BURP3, DETECTOR       166
EGAD, CALC OF EXTERNAL GAMMA DOSE INTEGRALS    DP    360  F4     RS P     G $        600
EI    360  F+BAL RS P  CT H $ GKILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS            636
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EIGENVALUE EIGENVECTOR PACKAGE ANL  1108  F4     RS   X T P $ EISPACK, MATRIX       534
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EIGENVECTOR PACKAGE ANL  1108  F4     RS   X T P $ EISPACK, MATRIX EIGENVALUE      534
EIGENVECTOR PACKAGE ANL  6600  F4     RS   X T P $ EISPACK, MATRIX EIGENVALUE      534
EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL   360  F4     RSB  XCT P $       534
EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL   635  F4     RS   X T P $       534
EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL  1108  F4     RS   X T P $       534
EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL  6600  F4     RS   X T P $       534
ELASTIC ANALYSIS      BAPL 6600  F+COM RS P X T I $ MATUS, 3-D FINITE ELEMENT      597
ELASTIC SCAT RESONANCES AI    360  F4     RS PLX T B $ AILMCE, X-SECTION CALC       147
ELASTIC SCAT RESONANCES AI   7094  F+FAP RS PL  T B $ AILMCE, X-SECTION CALC       147
ELASTIC SCAT X-SEC    BNL  6600  F4     RS P     A $ BESFIT, DIFFRACTION MODEL     524
ELASTIC SCAT X-SECTIONS HEX LATTICE   GGA  1108  F4     RS       B $ HEXSCAT,        291
ELASTIC SCATTERING PHASE-SHIFT ANALYSIS ORNL 1604  F63   RS P     A $ PEGGY,          334
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ELASTIC STRESS OF PIPING SYSTEM     BAPL 6600  F4     RS P   T I $ MO457,PIPE,       329
ELASTIC STRUCTURAL DYNAMICS       BAPL 6600  F4     RS P   T I $ MO266, LINEAR       383
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ELASTIC SYSTEMS BAPL 6600  F4     RS P   T I $ MO552, DYNAMIC ANALYSIS LINEAR      283
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ELECTRICITY COSTS     UEC  6600  F4     RS P     D $ POWERCC, NUCLEAR STATION       340
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ELECTRON DISTRIBUTION   KAPL 6600  F4     RS P     O $ DYNC1, PHOTOMULTIPLIER       464
EMERALD, PWR PLANT RADIATION RELEASE & DOSE     PGE   360  F4     RS P  CT G $     546
EMERGENCY COOLING     BCL  6400  F4     RS P   T G $ ECCSA4, LOSS-OF-COOLANT &      330
ENDF MULTIGROUP X-SECTION CALCULATION   ANL   360  F4     RS P  CT B $ MC**2,       355
ENDF MULTIGROUP X-SECTION CALCULATION   ANL  3600  F36   RS P   T B $ MC**2,        355
ENDF TAPES    BNL  7090  F+FAP RS P   T M $ DFSR, DATA FILE SERVICE ROUTINES        236
ENDF/B  ORNL  360  F4     RSBP XCT B $ XLACS, XSDRN MULTIGROUP LIBRARIES FROM      572
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ENDF/B DATA  BAPL 6600  F4    RS P   T B $ EPOCH, NEUTRON AGE CALCULATION OF     461
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ENDF/B DATA TAPES   GGA  1108  BIN   R   L   T Z $ ZPR-III ASSEMBLY 48 GAFGAR     356
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ENDF/B GRAPHIC X-SEC EVALUATION AI    360  F+BAL RSB L CT M $ SCORE3, SCISRS     375
ENDF/B RESONANCE XSECTION CODES  BNL  6600B F4    RS P   T A $ RESEND,ADLER,     465
ENDF/B SCAT KERNELS    DP    360  BCD   R   LX T Z $ THERMOS LIBRARY, 30-GP     543
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ENDF/B TAPE PROCESSING AND EDITING     ORNL 6600  F4    RS P   T M $ EDITOR,     502
ENDF/B THERMAL SCATTERING DATA  DP    360B F4    RS P XCT A $ FLANGE2(71-1),     368
ENDF/B TO GAFGAR X-SECTIONS GGA  1108  F5    PS P   T B $ ENDFB2,GAND2,GFE2,     596
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ENDF/B TO MC**2 DATA CONVERSION          APDA 3600  ASAF4 RS P   T M $ ETOE,     350
ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT WAPD 6600  F4    RS PL  T B $ ETOG1,     437
ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT WAPD 7600  F4    RS P   T B $ ETOG3,     538
ENDF/B V1 PROC BNL  6600B F4    RS     T M $ CHECKER,CRECT,DAMMET,PLOTFB,...     384
ENDF/B V2 PROC  BNL  6600B F4    RS     T M $ CRECT,CHECKER,RIGEL,PLOTFB,...     475
ENDF/B V2 PROCESSING CODES       ANL   360  F4    RS P   T M $ CRECT,CHECKER,     475
ENDF/B V3 DATA PROCESSING CODE          ANL   360  F4    RS     T M $ RIGEL,     571
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ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B DATA GESV  635  F+GMP RS P XCT B $     501
ENEA  360  F4    RS P    A $ PSEUDO, STATISTICAL RESONANCE PARAMETER CALC         292
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ENERGY INTERVAL X-SECTION AVERAGING     GGA  7044  F4    RS P    L $ GAVER,       218
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ENVIRNMNTL LIB SCOPE2.0 CEND 7600B F4    RS     T P $ MODEL, MODIFIED BETTIS     478
ENVIRNMNTL LIB SCOPE3.2 CDC  6600C F+COM RS     T P $ MODEL, MODIFIED BETTIS     478
ENVIRNMNTL LIB SCOPE3.3 CDC  6600D F+COM RS     T P $ MODEL, MODIFIED BETTIS     478
ENVIRONMENTAL ROUTINES, FORTRAN UTILITIES ANC  360  F+BAL RS     T P $ NRTS       613
ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.  NED   635  F+GMP RS     T P $ GENED      515
ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BAPL 6600A F+ASC RS     T P $ BETTIS     478
ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BW   6600B F+ASC RS     T P $ BETTIS     478
EPITHERMAL X-SECTIONS NED   635  F4    RS P   T B $ PEAX, RESOLVED RESONANCE     257
EPITHERMOS, SPECTRUM AND X-SECTION CALCULATION NED  7094  F+FAP RS P   T B $     201
EPOCH, NEUTRON AGE CALCULATION OF ENDF/B DATA  BAPL 6600  F4    RS P   T B $     461
EQN SOLN CURVE PLOT  KAPL 6600  F+ASC RS P   T P $ SNEC, NONLINEAR ALGEBRAIC     364
EQN SYSTEM SOLVER  ANL   360B F4    RS P  C  P $ GEAR, ORDINARY DIFFERENTIAL     592
EQN SYSTEM SOLVER  LIL   6600B F4    RS P     P $ GEAR, ORDINARY DIFFERENTIAL     592
EQUILIBRIUM FUEL CYCLE CALCULATION      GGA  1108  F4    S     T D $ GAFFE,       302
EQUIPOISE3, 2-D 2-GROUP DIFFUSION SLAB CYL      CRNL 7090  F2    RS P   T C $      39
EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB   CDC  1604  F63   RS P   T C $      87
EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB   CRNL 7090  F2    RS P   T C $      87
ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION SLA  6600  F4    RS P     P $     601
ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION SLA  6600  F4    RS P     P $ ERF,     601
ERREST, LOCA ROD BUNDLE CHF DATA ANALYSIS       ANC   360  F4    RS PL CT M $     518
ERROR & COMPLEMENTARY ERROR FUNCTION SLA  6600  F4    RS P     P $ ERF,ERFC,     601
ERROR FUNCTION SLA  6600  F4    RS P     P $ ERF,ERFC, ERROR & COMPLEMENTARY     601
ESP, MONTE CARLO REACTOR ANALYSIS CALCULATION   CRNL  360  F+BAL RSBPL CT C $     523
ESTIMATE ORNL  360C F4    RS P XCT C $ CONCEPT3, POWER PLANT CONCEPTUAL COST     498
ESTIMATING     ORNL 360B F4    RS P   T D $ ORCOST, POWER PLANT CAPITAL COST     588
ETOE, ENDF/B TO MC**2 DATA CONVERSION           ANL   360  F4    RS P  CT M $     350
ETOE, ENDF/B TO MC**2 DATA CONVERSION           APDA 3600  ASAF4 RS P   T M $     350
ETOG1 DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2     WAPD 6600  BCD   R   L   T Z $     447
ETOG1, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT  WAPD 6600  F4    RS PL  T B $     437
ETOG3, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT  WAPD 7600  F4    RS P   T B $     538
ETOM1, ENDF/B FORMAT TO MUFT FORMAT X-SECTIONS  WAPD 6600  F4    RS P   T B $     436
ETOT2, THERMAL LIBRARIES FROM ENDF/B DATA       WAPD 7600  F4    RS P   T B $     509
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ETOT3, ENDF/B V3 DATA TO THERMAL LIBRARY FORM  WAPD 7600  F4    RS P    T B $     628
ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR 1DX  HEDL 1108B F4    RS P X T B $      388
EXCHANGER STRESS ANALYSIS    KAPL 6600  F4    RS P     I $ TUBE, U-TUBE HEAT     378
EXCURSION  ANL   360  F4    RS P  CT F $ REXCO-H, 2-D HYDRODYNAM RESPONSE TO      550
EXCURSION ANALYSIS  ANC   360  F4    RSBP XCT G $ RELAP3, REACTOR BLOWDOWN -      369
EXCURSION ANALYSIS  ANC  1108  F4    RS P   T G $ RELAP3, REACTOR BLOWDOWN -      369
EXCURSION ANALYSIS  ANC  6600  F4    RS P   T G $ RELAP3, REACTOR BLOWDOWN -      369
EXCURSION ANL   360  F4    RS P  CT F $ REXCO-H2, 2-D HYDRODYNAM RESPONSE TO     615
EXCURSION CALCULATION R-Z GEOMETRY   APDA 7094  F4    RS P     F $ MARS, 2-D      293
EXCURSION CALCULATIONS       NED  2000  F4    RS P   T F $ FORE, FAST REACTOR     174
EXCURSION CALCULATIONS       ANL   360  F4    RS P X T F $ FORE2, FAST REACTOR    174
EXCURSION CALCULATIONS       NED   635  F4    RS P X T F $ FORE2, FAST REACTOR    174
EXCURSION DISASSEMBLY   ANL   360  F4    RS P XCT F $ VENUS, 2-D LMFBR POWER     511
EXPALS, LEAST SQUARES EXPONENTIAL DECAY CURVES LLL  7094  F2    RS P     P $      321
EXPERIMENT     UCND  360B F+BAL RS P     O $ PMS1, FAST NEUTRON POLARIZATION     469
EXPERIMENT ANALYSIS          BAPL 6600  F4    RS P   T O $ JITER, FLUCTUATION     394
EXPERIMENT ANALYSIS    AGC  7090  F2    RS P     O $ CROC90, ML-1 FLUID FLOW     154
EXPERIMENT ANALYSIS BAPL 6600  F4    RS P   T O $ REDUX, REACTOR FLUCTUATION     425
EXPERIMENTAL DATA POINTS KAPL 6600  F+ASC RS P   T P $ CURFIT, CURVE FITTING      43
EXPERIMENTAL DESIGN MLMC  360  F4    RSBP  C  P $ LATIN SQ, NXN LATIN SQUARE     630
EXPERIMENTAL NEUTRON DATA LIBRARY       LLL  7094  F+FAP RS PL  T M $ ECSIL,      351
EXPLOSION, COUPLED NEUTRON-HYDRODYNAMICS  APDA 7094  F2    RS P     F $ WEAK      145
EXPN, ANALYSIS OF PULSED NEUTRON SOURCE DATA   NED   635  F4    RS P   T O $      258
EXPONENTIAL DECAY CURVES LLL  7094  F2    RS P     P $ EXPALS, LEAST SQUARES     321
EXPONENTIALS MIT  7090  F2    RS P     P $ FRANTIC, LEAST SQUARES FIT SUM OF     324
EXT, X-SECTIONS FROM B-W RESONANCE PARAMETERS  WANL 7094  F2    RS P     A $      238
EXTERMINATOR, 2-D MULTI-GP DIFFUSION PROGRAM   ORNL 7090  F+FAP RS P   T C $      156
EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM  BC    625  F4    RS       T C $      156
EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM  CE   6600  F4    RS P   T C $      156
EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM  ORNL  360  F4    RS P   T C $      156
EXTERNAL GAMMA DOSE INTEGRALS    DP   360  F4    RS P     G $ ECAD, CALC OF       600
EXTERNAL+INTERNAL DOSE AI   7094  F+FAP RS PL  T G $ CURIE,DOSE,THUNDERHEAD,      196
EXTREME VALUE DISTRIBUTION DATA ANALYSIS BAPL 6600  F4    RS P     P $ BHS9,       621
F+ASC R       T L $ DATATRAN 2-D GEOMETRY INPUT, PREPARATION, EDIT KAPL 6600B     406
F+ASC P       T P $ DATATRAN UTILITY MODULES, 2-D & 3-D PLOTTING   KAPL 6600B     407
F+ASC R P     T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BCS  6600C     275
F+ASC RS        P $ SIMPLE1, TIME-SHARING PROGRAMMING LANGUAGE     KAPL 6600      442
F+ASC RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BAPL 6600A     478
F+ASC RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BW   6600B     478
F+ASC RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BAPL 6600A     275
F+ASC RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BAPL 6600C     275
F+ASC RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BW   6600B     275
F+ASC RS P    T H $ LION4, 3-D TEMPERATURE DISTRIBUTION PROGRAM    KAPL 6600      299
F+ASC RS P    T I $ GEM, EIGENVALUE PROBLEM FOR VIBRATING SYSTEMS  KAPL 6600      344
F+ASC RS P    T J $ ASPIS, GAMMA RAY SOURCE BUILDUP FACTOR CALC    BAPL 6600      429
F+ASC RS P    T J $ SPAN4, A POINT-KERNEL SHIELD EVALUATION CODE   BAPL 6600B     462
F+ASC RS P    T P $ CURFIT, CURVE FITTING EXPERIMENTAL DATA POINTS KAPL 6600       43
F+ASC RS P    T P $ DATATRAN UTILITY MODULES, 2-D + 3-D PLOTTING   KAPL 6600      407
F+ASC RS P    T P $ DOGGY, DESK CALCULATOR FORM SHEET OP PACKAGE   KAPL 6600      428
F+ASC RS P    T P $ LIZARD, NONLINEAR DIFFERENTIAL EQNS. SOLUTION  KAPL 6600      445
F+ASC RS P    T P $ SNEQ, NONLINEAR ALGEBRAIC EQN SOLN CURVE PLOT  KAPL 6600      364
F+ASC RS P X T B $ PES02,RESCO,DBF1, RESONANCE INTEGRAL FEX CELL   BAPL 6600      285
F+ASC RSB   X T M $ TIGIR2, MODULAR DOCUMENT INFORMATION SYSTEM    KAPL 6600B     403
F+ASM RSB    CT P $ WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG   ANL  360       541
F+ASM RSB    CT P $ WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG   ANL  360B      541
F+BAL  S      T M $ JOSHUA, DATA STORAGE, RETRIEVAL, AND DISPLAY   DP   360       490
F+BAL  S    X T B $ RAHAB, JOSHUA SYSTEM LATTICE PHYSICS MODULES   DP   360       536
F+BAL R B L   T P $ TSO-SPEAKEASY, LANGUAGE PROCESSOR UNDER TSO    ANL  360       593
F+BAL RS      T P $ AMDLIBF, ARGONNE SUBROUTINE LIBRARY CAT. F     ANL  360       563
F+BAL RS      T P $ FIGS, IBM360&2250 FORTRAN GRAPHICS SUBROUTINES AI   360       484
F+BAL RS      T P $ NFTS ENVIRONMENTAL ROUTINES, FORTRAN UTILITIES ANC  360       613
F+BAL RS     CT P $ PROGLOOK, USER PROGRAM PERFORMANCE MONITOR     SLAC 360       642
F+BAL RS P      O $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC ORNL 360       322
F+BAL RS P      O $ PMS1, FAST NEUTRON POLARIZATION EXPERIMENT     UCND 360B      469
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F+BAL F+FAP

F+BAL	RS	P		T	A	$	COMNUC,CASCADE, COMPOUND NUCLEUS REACTION	AI	360	482
F+BAL	RS	P		T	B	$	RAFFLE, 1ST FLIGHT COLLISION PROBABILITIES MC	ORNL	360B	392
F+BAL	RS	P		T	C	$	CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM	AAEC	360	103
F+BAL	RS	P		T	C	$	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	ANL	360	209
F+BAL	RS	P		T	C	$	GAMBLE5, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY	GGA	1108	222
F+BAL	RS	P		T	C	$	GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR MESH	GGA	1108	401
F+BAL	RS	P		T	C	$	GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL	GGA	1108	430
F+BAL	RS	P		T	D	$	BUGTRI, 2-D MULTIGP DIFFUSION+BURNUP TRI-MESH	GGA	1108	439
F+BAL	RS	P		T	D	$	BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP XY, RZ	GGA	1108	438
F+BAL	RS	P		T	D	$	CINDER,M0102, POINT DEPLETION FISSION PRODUCT	DP	360	313
F+BAL	RS	P		T	D	$	PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	IBM	360A	336
F+BAL	RS	P		T	E	$	AIROS2A, SIMULATION OF REACTOR DYNAMICS	AI	360	326
F+BAL	RS	P		T	E	$	BLOOST6, COMBINED KINETICS 2-D HEAT TRANSFER	GGA	1108	303
F+BAL	RS	P		T	I	$	SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY	ORNL	360	332
F+BAL	RS	P		T	O	$	GSSLRN1B, LEAST SQUARES PHOTOPEAK SPECTRA CODE	BNW	1108	457
F+BAL	RS	P		T	O	$	TOAD, PROCESSING OF ANALYZER GAMMA-RAY SPECTRA	GGA	1108	333
F+BAL	RS	P	CT	B		$	U3R, UNRESOL RESONANCE XSEC PROBABILITY TABLES	AI	360	553
F+BAL	RS	P	CT	H		$	6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS	EI	360	636
F+BAL	RS	P	CT	M		$	ARC-SYSTEM, SYSTEM SUBPROGRAMS AND MODULES	ANL	360	522
F+BAL	RS	P	X T	B		$	HWOCR-SAFF, 2-D MONTE CARLO CELL CALCULATION	AI	360	307
F+BAL	RS	P	XCT	B		$	HAMMER,LITHE,HELF, CRITICAL ANALYSIS SYSTEM	DP	360	277
F+BAL	RS	P	XCT	D		$	PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION	ANC	360F	275
F+BAL	RSB	L	CT	M		$	SCORE3, SCISRS ENDF/B GRAPHIC X-SEC EVALUATION	AI	360	375
F+BAL	RSBP			T	D	$	PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	MIT	360B	336
F+BAL	RSBP			T	M	$	SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA	1108	607
F+BAL	RSBP		CT	C		$	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE	DP	360B	450
F+BAL	RSBP		CT	G		$	CONTEMPT-LT/022, PRESSURE-TEMPERATURE RESPONSE	ANC	360B	433
F+BAL	RSBPL		CT	C		$	ESP, MONTE CARLO REACTOR ANALYSIS CALCULATION	ORNL	360	523
F+BAL	RSBPL		CT	C		$	KENO, MONTE CARLO MULTIGROUP CRITICALITY CODE	ORNL	360	450
F+BAL	RSBPL		CT	D		$	REBUS2, FUEL CYCLE ANALYSIS FOR FAST REACTORS	ANL	360	634
F+BAL	RSBPL		CT	G		$	PARET, WATER-COOLED CORE TRANSIENT ANALYSIS	ANC	360	555
F+BAL	RSBPL		XCT	G		$	RELAP4, TRANSIENT THERMAL-HYDRAULIC ANALYSIS	ANC	360C	369
F+C+R	RSBP			T	M	$	RALCRTPH, RESOURCE ALLOCATION PROJECT PLANNING	MLMO	360	603
F+COP	RS	P		T	P	$	LAG, ASSEMBLER FOR FLOCC2 INSTRUCTION SET	PW	1604	186
F+COP	RS	P	X T	B		$	FMC-N,FMC-G, MC NEUTRON, GAMMA-RAY HISTORIES	PW	1604	195
F+COM	R			T	M	$	DATATRAN, MODULAR PROGRAMMING AND DATA SYSTEM	KAPL	6600B	386
F+COM	RS			T	P	$	KAPLPLOT, KAPL CALCOMP PLOTTING ROUTINES	KAPL	6600	496
F+COM	RS			T	P	$	LASLIB, LOS ALAMOS SUBROUTINE LIBRARY ROUTINES	LASL	6600B	633
F+COM	RS			T	P	$	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.2	CDC	6600C	478
F+COM	RS			T	P	$	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.3	CDC	6600D	478
F+COM	RS	P			H	$	HYMAS, HYDRODYNAMIC MASS MATRIX GENERATION	BAPL	6600	560
F+COM	RS	P		T	I	$	DUZ2, 2-D AXISYMMETRIC & PLANE ELASTIC-PLASTIC	BAPL	6600	503
F+COM	RS	P		T	I	$	GAPL3, INELASTIC LARGE DEFLECTION STRESS STUDY	BAPL	6600	397
F+COM	RS	P		T	P	$	LENSDES, NONLINEAR LEAST SQ LENS DESIGN SYSTEM	LASL	6600	602
F+COM	RS	P		T	Q	$	INDX, XRAY DIFFRACTION POWDER PATTERN INDEXING	LASL	6600	609
F+COM	RS	P	X T	B		$	PAX03, HARMONY-PDQ X-SECTION GENERATION CODE	BAPL	6600	426
F+COM	RS	P	X T	D		$	FARED, 1-D FAST REACTOR DESIGN & SURVEY STUDY	BW	6600	427
F+COM	RS	P	X T	I		$	MATUS, 3-D FINITE ELEMENT ELASTIC ANALYSIS	BAPL	6600	597
F+COM	RS	PLX	T	C		$	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE	RFD	6600	450
F+FAP	RS			T	I	$	4RESTRAINT PIPE STRESS, MAXIMUM MOMENT CALC	AI	7090	109
F+FAP	RS	L		T	B	$	QUICKIE, INFINITE MEDIUM SPECTRUM X-SECTIONS	AI	7090	119
F+FAP	RS	L		T	C	$	FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	AI	7090	120
F+FAP	RS	L		T	C	$	ULCER, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	AI	7090	118
F+FAP	RS	L		T	M	$	MOMUS, X-SECTION LIBRARY UTILITY PROGRAM	AI	7094	159
F+FAP	RS	P			I	$	WIREX, COMPUTER-PRODUCED WIRING LISTS UHTREX	LASL	7090	315
F+FAP	RS	P			J	$	SHOE, SHIELD WEIGHT OPTIMIZATION DOSE CALC	AI	7094	197
F+FAP	RS	P		T	B	$	EPITHERMCS, SPECTRUM AND X-SECTION CALCULATION	NEC	7094	201
F+FAP	RS	P		T	B	$	SOPHIST1/2/5, MULTI-GP TRANSFER COEFFICIENTS	LLL	7090	160
F+FAP	RS	P		T	C	$	EXTERMINATOR, 2-D MULTI-GP DIFFUSION PROGRAM	ORNL	7090	156
F+FAP	RS	P		T	D	$	ASSAULT, 2-D MULTI-GP DIFFUSION DEPLETION CODE	ORNL	7090	240
F+FAP	RS	P		T	G	$	AISITE2, PARAMETRIC SITE REQUIREMENT STUDY	AI	7094	172
F+FAP	RS	P		T	H	$	HEATING2, TRANSIENT STEADY-STATE HEAT TRANSFER	AI	7094	198
F+FAP	RS	P		T	L	$	DPC, DATA PREPARATION FOR 2-D DESIGN PROGRAMS	LASL	7090	234
F+FAP	RS	P		T	M	$	DFSR, DATA FILE SERVICE ROUTINES ENDF TAPES	BNL	7090	236

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F+FAP RS PL   T B $ AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES AI   7094   147
F+FAP RS PL   T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV    BNW  7090   185
F+FAP RS PL   T B $ GRAVE, GROUP-AVERAGING X-SECTIONS PARAMETERS   AI   7094   162
F+FAP RS PL   T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS  AI   7090    50
F+FAP RS PL   T B $ TYCHE3, MONTE CARLO SLOWING-DOWN DENSITY CALC  AI   7094   149
F+FAP RS PL   T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   AI   7090    29
F+FAP RS PL   T G $ CURIE,DOSE,THUNDERHEAD, EXTERNAL+INTERNAL DOSE AI   7094   196
F+FAP RS PL   T M $ ECSIL, EXPERIMENTAL NEUTRON DATA LIBRARY       LLL  7094   351
F+FAP RSB     T A $ TUZ, UNRESOLVED REGION RESONANCE INTEGRAL CALC GGA  7090    42
F+FAP RSB     T A $ ZUT, RESOLVED REGION RESONANCE INTEGRAL CALC   GGA  7090    41
F+FAP RSBP    T D $ DDB, 2-D FEW-GP DIFFUSION BURNUP RZ GEOMETRY   GGA  7090    90
F+FAP RSBP    T Q $ CASCADE,CLUSTER, RADIATION DAMAGE IN METALS    GEC   635   419
F+FAP RSBPL   T C $ CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM   UK-R 7090   103
F+FAP RSBPL   T N $ CPS, SC4020 PLOTS FROM SCISRS X-SECTION TAPES  WANL 7094   239
F+FAP RSBPLX  T B $ AGN-GAM, FAST SPECTRUM MULTI-GP CONSTANT CALC  AGC  7090   204
F+GMP RS      T P $ GENED ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.  NEC   635   515
F+GMP RS P    T D $ SYN, 2D SYNTHESIS MULTIGP DIFF & 1GP DEPLETION NEC   635   495
F+GMP RS P XCT P $ ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B DATA  GESV  635   501
F+GMP RS P XCT L $ TDOWN, SPATIAL & COMPOSITION-DEPENDENT X-SECS   GESV  635   505
F+GMP RSBP    T H $ THTE, 3-D TRANSIENT HEAT TRANSFER PROGRAM      GEC   635   346
F+MAP RS P      A $ CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST DATA AI   7094   215
F+MAP RS P      A $ COMBCO, COMBINED B-W MULTI-LEVEL CONVOLUTION   PPCO 7040   203
F+MAP RS P    T B $ GAROL, RESONANCE OVERLAP AND LATTICE EFFECTS   GGA  7044   219
F+MAP RS P    T B $ GAROL, RESONANCE OVERLAP AND LATTICE EFFECTS   LER  7094   219
F+MAP RS P    T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM   BC   625   209
F+MAP RS P    T C $ TDSN, 2-D MULTIGROUP DISCRETE ORDINATE PROGRAM LER  7090   312
F+MAP RS P    T D $ OPUS, POWER PLANT PERFORMANCE AND PRICE STUDY  GGA  7044   226
F+MAP RS P    T E $ AIROS, SPACE-INDEPENDENT KINETICS W/FEEDBACK   AI   7094   163
F+MAP RS P    T F $ TSN, SPATIALLY-DEPENDENT REACTOR KINETICS      AI   7094   309
F+MAP RS P    T H $ BLOOST5, POINT-KINETICS WITH 2-D HEAT TRANSFER GGA  7044   205
F+MAP RS P    T H $ TOODEE, 2-D TIME-DEPENDENT HEAT CONDUCTION     PPCO 7044   349
F+MAP RS PLX  T A $ TRIX1, RESONANCE INTEGRAL X-SECTION CALC       AI   7094   208
F+MAP RS PLX  T B $ LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE   WAPD 7094   249
F+MAP RSBP      M $ UNPACK, RETRIEVAL FROM SCISRS X-SECTION TAPE   GGA  7044   206
F+MAP RSBP    T C $ GAMBLE4, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  7044   222
F+MAP RSBP    T G $ SATURATED BLOWDOWN2, BLOWDOWN ANALYSIS LOFT    KE   7094   200
F+P+A RS      T P $ AMDLIBAE, ARGONNE SUBROUTINE LIBRARY CAT. A-E  ANL   360   562
F+P+A RS      T P $ AMDLIBGZ, ARGONNE SUBROUTINE LIBRARY CAT. G-Z  ANL   360   564
F+P+A RSBP XCT W $ GAUSS6, BATCH ANALYSIS OF GAMMA-RAY SPECTRA     ANC   360   622
F+SL  RS P XCT R $ HERMES, REGIONAL RADIOLOGICAL EFFECTS ANALYSIS  HEDL 1108   527
F+SPS RSBP    T N $ CROSSPLOT, SC4020 PLOTS FROM X-SECTION TAPES   GGA  7044   207
FACTOR CALC     BAPL 6600  F+ASC RS P   T J $ ASPIS, GAMMA RAY SOURCE BUILDUP 429
FACTOR CALC FOR CYLINDRICAL FINS ANC   360  F4     RSBP   CT J $ VIEWPIN, VIEW 569
FACTOR SHIELDING CODE CAVITY GEOM GGA  1108  F4     RS P   T J $ MUSCAT, VIEW 259
FACTORS      ORNL  360  F4     RS P   T A $ ATHENA4, INELASTIC SCATTERING FORM 417
FAILURE MODF    BAPL 6600  F4     RS P     P $ RELO1, RELIABILITY FOR A SINGLE 497
FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   AI   7090  F+FAP RS  L  T C $ 120
FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604  F63   RS PLX T C $ 120
FAIMOS, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE BHSC  360  F4     RS P   T C $ 120
FAP   RS P   T H $ RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS     LASL 7094   242
FAP   RSBP X T C $ SPECTRA, MC CALCULATION IRRADIATED MATERIAL     GEC  7090   422
FARED, 1-D FAST REACTOR DESIGN & SURVEY STUDY  BW   6600  F+COM RS P X T D $ 427
FARSE1A, DOSE RATE FROM SNAP SHIELD LEAKAGE    AI   7090  F2    RS       J $  91
FAST + INTERMEDIATE POWER TRANSIENTS BAPL 6600  F4     RS P   T H $ CHIC-KIN, 473
FAST BREEDERS     NED   635  F4     RS P     D $ RAPFU, FUEL CYCLE PARAMETERS 372
FAST NEUTRON POLARIZATION EXPERIMENT     UCND  3608 F+BAL RS P     O $ PMS1, 469
FAST NEUTRON SPECTRUM X-SECTION CALC     AI   7090  F2    RS PL  T B $ FORM,  51
FAST NEUTRON SPECTRUM X-SECTION CALC     ANL  3600  F63   RS  LX T B $ GAM1,  33
FAST NEUTRON SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PL  T B $ FORM,  51
FAST NEUTRON SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PLX T B $ GAM1,  33
FAST NEUTRON SPECTRUM X-SECTION CALC     GGA  7090  F2    RS PLX T B $ GAM1,  33
FAST NEUTRON SPECTRUM X-SECTION CALC     OSUC  370  F4    RS PLXCT B $ FORM,  51
FAST REACTOR CORE ACCIDENT ANALYSIS   NED   635  F4     RS P   T G $ FREADM1, 479
FAST REACTOR DESIGN & SURVEY STUDY  BW   6600  F+COM RS P X T D $ FARED, 1-D 427
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FAST REACTOR EXCURSION CALCULATIONS      NED  2000  F4    RS P   T F $ FORE,     174
FAST REACTOR EXCURSION CALCULATIONS     ANL   360  F4    RS P X T F $ FORE2,    174
FAST REACTOR EXCURSION CALCULATIONS     NED   635  F4    RS P X T F $ FORE2,    174
FAST REACTOR FUEL BURNUP & MANAGEMENT  NED   635  F4    RS P   T D $ FUMBLE,    480
FAST REACTOR FUEL ELEMENT BEHAVIOR      ANL   360  F4    RS P   T I $ LIFE1,    460
FAST REACTOR POWER AND FLOW TRANSIENTS  ANL   360  F4    RS P   T F $ SASIA,    400
FAST REACTOR POWER AND FLOW TRANSIENTS  ANL  6600  F4    RS P   T F $ SASIA,    400
FAST REACTOR X-SEC CALC BNW  1108  F4    RS P   T B $ FCC4, FUNDAMENTAL MODE    306
FAST REACTORS  ANL   360  F+BAL RSBPL CT D $ REBUS2, FUEL CYCLE ANALYSIS FOR    634
FAST SPECTRA CALC   ANC   360  F4    RS PLXCT B $ PHROG, MULTI-GP CONSTANT &    520
FAST SPECTRUM MULTI-GP CONSTANT CALC  AGC  7090  F+FAP RSBPLX T B $ AGN-GAM,    204
FAST THERMAL SPECTRA GGA  1108  F4    RS PLX T B $ GGC4, MULTI-GP X-SECTIONS   298
FAST THERMAL SPECTRA GGA  6600  F4    RS  L  T B $ GGC4, MULTI-GP X-SECTIONS   298
FAST X-SECTION GENERATION   BNW  1108  F4    RS P X T B $ 1DX, 1-D DIFFUSION   374
FATIGUE     KAPL 6600  F4    RS        I $ SORSDB, PRESSURE VESSEL STRESS AND  391
FAU, RADIO FREQUENCY MANAGEMENT SYSTEM ALOC  360  COBOL RS P      M $ AEC-ALC   587
FAULT TREE EVALUATION CODES  ANC   360  F4    RSBP  CT G $ PREP,KITT, SYSTEM   528
FAULT TREE EVALUATION CODES  ANC  1108  F4    RS P   T G $ PREP,KITT, SYSTEM   528
FCC4, FUNDAMENTAL MODE FAST REACTOR X-SEC CALC BNW  1108  F4    RS P   T B $   306
FEEDBACK  BAPL 6600  F4    RS P   T F $ NOWIG, 1-D 2-GP KINETICS TEMPERATURE   371
FEEDBACK  BAPL 6600  F4    RS P   T F $ TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION   338
FEEDBACK BNL  6600  F4    RS P   T F $ NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION   405
FEEDBACK GGA  1108  F4    RS P   T F $ GAKIT, 1-D MULTIGP KINETICS WITH TEMP   370
FEVER, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM  GGA  7090  F2    RSB    T D $   117
FEVER7, 1-D MULTIGROUP DIFFUSION AND DEPLETION GGA  1108  F4    RS P   T D $   318
FEW-GP DIFFUSION BURNUP RZ GEOMETRY   GGA  7090  F+FAP RSBP   T C $ CDB, 2-D    99
FEW-GP DIFFUSION CALC HEX-Z MESH      GGA  1108  F4    RS P   T C $ GATT, 3-D   380
FEW-GP DIFFUSION DEPLETION     ANC   360F F+BAL RS P XCT C $ PDQ7, 1,2 OR 3-D  275
FEW-GP DIFFUSION DEPLETION     BAPL 6600A F+ASC RS P   T C $ PDQ7, 1,2 OR 3-D  275
FEW-GP DIFFUSION DEPLETION     BAPL 6600C F+ASC RS P   T C $ PDQ7, 1,2 OR 3-D  275
FEW-GP DIFFUSION DEPLETION     BCS  6600D F+ASC R B    T C $ PDQ7, 1,2 OR 3-D  275
FEW-GP DIFFUSION DEPLETION     BW   6600B F+ASC RS P   T C $ PDQ7, 1,2 OR 3-D  275
FEW-GP DIFFUSION DEPLETION   GGA  7044  F4    RS P   T D $ RELCAD-FEVER, 1-D   221
FEW-GP DIFFUSION DEPLETION PROGRAM  ANC   360  F4    RSBP  CT D $ DWARF, 1-D   579
FEW-GP DIFFUSION DEPLETION PROGRAM  GGA  7090  F2    RSB    T D $ FEVER, 1-D   117
FEW-GP DIFFUSION DESIGN SYSTEM    AI   360  F4    RSBP   T K $ THREDES, 1-D   273
FEW-GP DIFFUSION POWER DIST SEARCH  GGA  7044  F4    RS P   T C $ GASP2, 1-D   220
FEW-GP DIFFUSION SLAB CYLINDER SPHERE AI   7090  F2    RS P   T C $ FOG, 1-D    28
FEW-GP DIFFUSION SLAB CYLINDER SPHERE BC    625  F4    RS     T C $ FOG, 1-D    28
FEW-GP DIFFUSION SLAB CYLINDER SPHERE CDC  1604  F63   RS P   T C $ FOG, 1-D    28
FEW-GP DIFFUSION TEMP COEF CALC     GGA  7044  F4    RS P   T C $ TEMCO, 1-D   225
FEW-GP DISCRETE ORDINATES SLAB GEOMETRY  BAPL 6600  F4    RS P   T C $ BE21,   398
FEW-GP HEX GEOM DIFFUSION DEPLETION GGA  1108  F4    RS P   T D $ GAUGE, 2-D   339
FEW-GP SN APPROXIMATION CYLINDER    PPCO 7040  F4    RS P   T C $ TOPIC, 1-D   148
FEW-GP SN APPROXIMATION CYLINDER    PPCO 7090  F2    RS P   T C $ TOPIC, 1-D   148
FEW-GP SN DOUBLE SN APPROX SLAB GEOM PPCO 7090  F2    RS P     C $ MIST, 1-D    59
FEW-GP S4 APPROXIMATION RZ GEOMETRY  LLL   709  F2    RS       C $ FIRN, 2-D     7
FEW-GROUP DIFFUSION AND DEPLETION   IBM   360A F+BAL RS P   T D $ PDQ5, 2-D   336
FEW-GROUP DIFFUSION AND DEPLETION   MIT   360B F+BAL RSBP   T D $ PDQ5, 2-D   336
FEW-GROUP DIFFUSION SLAB CYLINDER CDC  1604  F63   RS P   T C $ 2DGRAND, 2-D   40
FEW-GROUP DIFFUSION SLAB CYLINDER ORNL 7090  F2    RS P   T C $ 2DGRAND, 2-D   40
FEW-GROUP SPACE-TIME KINETICS  BCL  6400  F4    RS P   T F $ ADEP, 1D AND 2D  494
FFEARS, LAPLACE EQUATION ISOTROPIC DIELECTRICS SLA  6600  F4    RS P     V $   577
FIGRO, LWBR FUEL SWELLING TEMPERATURE STUDY   BAPL 6600  F4    RS P   T H $   272
FIGS, IBM360&2250 FORTRAN GRAPHICS SUBROUTINES AI   360  F+BAL RS     T P $   484
FILE SERVICE ROUTINES ENDF TAPES    BNL  7090  F+FAP RS P   T M $ DFSR, DATA  236
FINDING ROOTS OF A POLYNOMIAL          KAPL 6600  F4    RS P     P $ RCPE,   444
FINE-GP CONSTANTS GENERATION  ORNL  360  F4    RS P   T B $ SUPERTOG, ENDF/B 431
FINEL, FINITE-ELEMENT STUDY 2,3-D STRUCTURES   KAPL 6600  F4    RS P X   I $   404
FINITE ELEMENT ELASTIC ANALYSIS     BAPL 6600  F+COM RS P X T I $ MATUS, 3-D  597
FINITE-ELEMENT GESV  635  F4    RS P  CT I $ BEHAVE2, OXIDE FUEL PERFORMANCE  568
FINITE-ELEMENT STUDY 2,3-D STRUCTURES   KAPL 6600  F4    RS P X   I $ FINEL,  404
FINS SNAP GEOM   AI   7090  F2    RS       J $ SCARF2, SCATTER FROM RADIATOR  110
FIRE 1- & 2-CELL ANALYSIS AI   360  F4    RS P   T G $ SCFIRE2, SODIUM POOL   559
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FIRE5, 1-D AGE-DIFFUSION SLAB CYLINDER SPHERE  AEB   360  F4    RS  L  T C $      9
FIRN, 2-D FEW-GP S4 APPROXIMATION RZ GEOMETRY  LLL   709  F2    RS        C $      7
FISSILE NUCLIDE DATA  BAPL 6600  F4    RS P   T P $ DAFT1, LEAST SQUARES FIT    327
FISSILE NUCLIDE X-SECTION EVALUATION   ORNL 7090  F4    RSBP     A $ MUFFLE,    323
FISSION PRODUCT  BAPL 6600  F4    RS P     D $ CINDER,M0102, POINT DEPLETION    313
FISSION PRODUCT  DP    360  F+BAL RS P   T D $ CINDER,M0102, POINT DEPLETION    313
FISSION PRODUCT ACTIVITY DIST STUDY GGA  7044  F4    RS P     D $ RAD2, HTGR     231
FISSION PRODUCT FUEL MODEL  ANC   360  F4    RSBP  CT I $ FPFM, STEADY-STATE     584
FISSION PRODUCT RELEASE ANALYSIS  BCL  6400  F4    RS P     G $ FRCRL2, LOCA   500
FISSION PRODUCT RELEASE GGA  1108  F4    RS P     D $ FREVAP6, HTGR METALLIC    301
FIT FISSILE NUCLIDE DATA  BAPL 6600  F4    RS P   T P $ DAFT1, LEAST SQUARES    327
FIT SUM OF EXPONENTIALS MIT  7090  F2    RS P     P $ FRANTIC, LEAST SQUARES   324
FITTING      LASL 7094  F4    RS      T P $ LASL LEAST SQUARES, GENERAL CURVE   62
FITTING    BAPL 6600  F4    RS P   T P $ M0661,M0657,M0626, POLYNOMIAL CURVE   411
FITTING    KAPL 6600  F4    RS P     A $ CLEM, ANGULAR DISTRIBUTION LEGENDRE   531
FITTING EXPERIMENTAL DATA POINTS KAPL 6600  F+ASC RS P   T P $ CURFIT, CURVE     43
FLAC, STEADY-STATE FLOW, PRESSURE DISTRIBUTION GGA  1108  F5    RS P     H $    395
FLANGE1, SCATTERING LAW X-SECTION CALCULATION  GGA  1108  F5    RS P     A $    247
FLANGE2(71-1), ENDF/B THERMAL SCATTERING DATA  DP    360B F4    RS P XCT A $    368
FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION   CDC  3600  F63   RSBP   T C $    167
FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION   MSS   360  F4    RS P  CT C $    167
FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION   NED   635  F4    RS P   T C $    167
FLASH3, LOSS-OF-COOLANT ACCIDENT ANALYSIS      BAPL 6600  F4    RS P   T G $    295
FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION    BAPL 6600  F4    RS P   T G $    448
FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION    MA-G  360  F4    RSBP  CT G $    448
FLAT, RESONANCE ABSORPTION, CELL   ANL  3600  F36   RSBP X T B $ RABBLE,WLIB,    281
FLIGHT COLLISION PROBABILITIES MC  ORNL  360B F+BAL RS P   T B $ RAFFLE, 1ST    392
FLOCO RS P     B $ MCS, MONTE CARLO NEUTRON PENETRATION STUDY     LASL 7090    202
FLOCO RS P     B $ ZOT, GROUP-COLLAPSING OF MULTI-GP X-SECTIONS   LASL 7090    113
FLOCO RSBP     C $ 2DXY, 2-D MULTI-GP SN APPROXIMATION XY GEOM    AGC  7090     18
FLOCO RSBP   T C $ GE-HAPO-S13, 1-D MULTI-GP DOUBLE SN APPROX     BNW  7090     75
FLOCO2 INSTRUCTION SET      PW   1604  F+CDP RS P   T P $ LAG, ASSEMBLER FOR    186
FLOT1,M0219, PWR FLOW TRANSIENT ANALYSIS       BAPL 6600  F4    RS P   T H $    331
FLOW     AI   7094  F2    RS P     H $ FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE   246
FLOW     MSS   360  F4    RS P     H $ FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE   246
FLOW & TEMPERATURE DIST.   ORNL  360  F4    RS P   T H $ CRRIBLE, ROD BUNDLE   629
FLOW AND HEAT TRANSFER AI   7094  F2    RS P   T G $ TRANS-FUGUE1, TRANSIENT    268
FLOW DIST. IN CYL COOLANT INLET PLENUM DP    360  F4    RS P     H $ PLENUM,    586
FLOW DISTRIBUTION  KAPL 6600  F4    RS P   T H $ HAFMAT, SYSTEM STEADY-STATE   616
FLOW EXPERIMENT ANALYSIS    AGC  7090  F2    RS P     C $ CROC90, ML-1 FLUID    154
FLOW IN LMFBR ROD BUNDLE    NED   635  F4    RS P   T H $ VELVET2, TURBULENT    458
FLOW STEAM     GGA  1108  F4    RS P   T H $ DYNAM, DYNAMIC ANALYSIS BOILING    440
FLOW STUDY STEAM-WATER MIX KAPL 6600  F4    RS P     H $ RAPP, HIGH-VELOCITY   382
FLOW TRANSIENT ANALYSIS        BAPL 6600  F4    RS P   T H $ FLOT1,M0219, PWR   331
FLOW TRANSIENTS  ANL   360  F4    RS P   T F $ SAS1A, FAST REACTOR POWER AND   400
FLOW TRANSIENTS  ANL  6600  F4    RS P   T F $ SAS1A, FAST REACTOR POWER AND   400
FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW     AI   7094  F2    RS P     H $    246
FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW     MSS   360  F4    RS P     H $    246
FLOW, PRESSURE DISTRIBUTION GGA  1108  F5    RS P     H $ FLAC, STEADY-STATE    395
FLUCTUATION EXPERIMENT ANALYSIS        BAPL 6600  F4    RS P   T D $ JITER,    394
FLUCTUATION EXPERIMENT ANALYSIS BAPL 6600  F4    RS P   T C $ REDUX, REACTOR   425
FLUID FLOW EXPERIMENT ANALYSIS    AGC  7090  F2    RS P     D $ CROC90, ML-1    154
FLUX DIST IN MULTI-PIN FUEL ELEMENT    AGC  7090  F2    RS P     B $ BOUNCE,   237
FLUX INPUT    PW   1604  F63   RS      C $ TOP, 2-D PERTURBATION TOC OP 2DXY   199
FLUX SETS   GESV H600  F4    RS P  CT C $ TRIAL, 3-D REACTION RATES FROM 2-D   585
FLUX SYNTHESIS PROGRAM CYL PW   1604  F63   RS      T C $ 2DXYL, 3-D MULTI-GP   192
FLUX-DOSIMETER ACTIVITY RELATION  GEC   635  F4    RSBP     D $ DOS, NEUTRON  423
FLUX-WEIGHTING OF DTF4 CROSS SECTIONS  LASL 6600  F4    RS P     N $ LARCA,    409
FLUX, X-SEC CALC ORNL  360  F+BAL RS P     D $ ISOSEARCH, ISOTOPE PRODUCTION   322
FLUX, X-SEC CALC ORNL 1604  F63   RS P     D $ ISOSEARCH, ISOTOPE PRODUCTION   322
FLUXES   LASL 6600  F4    RS P     N $ CAC1, SN PERTURBATION CODE USING DTF4   455
FMC-G, MC NEUTRON, GAMMA-RAY HISTORIES   PW   1604  F+CDP RS P X T B $ FMC-N,   195
FMC-N, MONTE CARLO CALC NEUTRON HISTORIES      GGA  7044  F4    RS P   T B $    195
FMC-N,FMC-G, MC NEUTRON, GAMMA-RAY HISTORIES   PW   1604  F+CDP RS P X T B $    195
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FOG CODES    AI   7090  F2     RS        C $ PERT, 1-D PERTURBATION FOR AIM AND     30
FOG CODES    BHSC  360  F4     RS P      C $ PERT, 1-D PERTURBATION FOR AIM AND     30
FOG CODES    CDC  1604  F63    RS        C $ PERT, 1-D PERTURBATION FOR AIM AND     30
FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE AI   7090  F2     RS P    T C $      28
FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE BC    625  F4     RS      T C $      28
FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE CDC  1604  F63    RS P    T C $      28
FORE, FAST REACTOR EXCURSION CALCULATIONS       NED  2000  F4     RS P    T F $     174
FORE2, FAST REACTOR EXCURSION CALCULATIONS      ANL   360  F4     RS P X T F $      174
FORE2, FAST REACTOR EXCURSION CALCULATIONS      NED   635  F4     RS P X T F $      174
FORM  WAPD 7600  F4     RS P    T B $ ETOT3, ENDF/B V3 DATA TO THERMAL LIBRARY     628
FORM FACTORS      ORNL  360  F4     RS P    T A $ ATHENA4, INELASTIC SCATTERING    417
FORM OR THREDES LIBRARY UTILITY ROUTINE  AI    360  F4     RSB L   T M $ CLIP,       271
FORM SHEET OP PACKAGE    KAPL 6600  F+ASC RS P    T P $ DOGGY, DESK CALCULATOR      428
FORM, FAST NEUTRON SPECTRUM X-SECTION CALC      AI   7090  F2     RS PL   T B $      51
FORM, FAST NEUTRON SPECTRUM X-SECTION CALC      CDC  1604  F63    RS PL   T B $      51
FORM, FAST NEUTRON SPECTRUM X-SECTION CALC      CSUC  370  F4     RS PLXCT B $       51
FORMAT TO MUFT FORMAT X-SECTIONS WAPD 6600  F4     RS P    T B $ ETOM1, ENDF/B       436
FORMAT WAPD 6600  F4     RS PL   T P $ ETOG1, ENDF/B TO MUFT, GAM, ANISN X-SEC      437
FORMAT WAPD 7600  F4     RS P    T B $ ETOG3, ENDF/B TO MUFT, GAM, ANISN X-SEC      538
FORMAT X-SECTIONS WAPD 6600  F4     RS P    T B $ ETOM1, ENDF/B FORMAT TO MUFT     436
FORSIM, SCLN OF SYSTEM OF ORDINARY DIFF EQNS    ORNL 6600  F4     RS P      P $      514
FORTRAN DYNAMIC STORAGE ALLOC   ORNL  360  BAL+F RS P    CT P $ GETCOR,FRECOR,     644
FORTRAN GRAPHICS SUBROUTINES AI     360  F+BAL RS      T P $ FIGS, IBM360E2250     484
FORTRAN TOC, 2-D MULTI-GP SN APPROXIMATION RZ  PW   1604  F63    RS P    T C $      161
FORTRAN UTILITIES ANC   360  F+BAL RS      T P $ NRTS ENVIRONMENTAL ROUTINES,        613
FPFM, STEADY-STATE FISSION PRODUCT FUEL MODEL   ANC   360  F4     RSBP    CT I $     584
FRANTIC, LEAST SQUARES FIT SUM OF EXPONENTIALS MIT  7090  F2     RS P      P $      324
FRCRL2, LOCA FISSION PRODUCT RELEASE ANALYSIS   BCL  6400  F4     RS P      G $      500
FREADM1, FAST REACTOR CORE ACCIDENT ANALYSIS    NED   635  F4     RS P    T G $      479
FRECOR, FORTRAN DYNAMIC STORAGE ALLOC   ORNL  360  BAL+F RS P    CT P $ GETCOR,     644
FREE-FORMAT CARD INPUT PROCESSOR        LASL  360  F4     RS P      L $ GENRD,       530
FREE-FORMAT CARD INPUT PROCESSOR        LASL 6600  F4     RS P      L $ GENRD,       530
FREQUENCY MANAGEMENT SYSTEM ALOC  360  COBOL RS P      M $ AEC-ALC FAU, RADIC       587
FREVAP6, HTGR METALLIC FISSION PRODUCT RELEASE GGA  1108  F4     RS P      D $      301
FSDP3, POINTWISE XSECS. FROM B-W PARAMETERS     GGA  1108  F5     RS P    CT A $     216
FTN   RS P    T I $ CHILES, LINEAR ELASTIC SINGULARITY MODELING     SLA  6600      611
FTN   RS P    T P $ SETS, SET EQUATION TRANSFORMATION SYSTEM        SLA  6600B     623
FUEL BURNUP & MANAGEMENT  NED   635  F4     RS P    T D $ FUMBLE, FAST REACTOR        480
FUEL CYCLE ANALYSIS FOR FAST REACTORS  ANL   360  F+BAL RSEPL CT D $ REBUS2,         634
FUEL CYCLE ANALYSIS PARTIAL REFUEL  GGA  7044  F4     RS P    T D $ GARGOYLE,          260
FUEL CYCLE ANALYSIS W/REFUELING   GGA  7044  F4     RS P    T D $ REVISED-GAD,       223
FUEL CYCLE CALCULATION      GGA  1108  F4     S      T D $ CAFFE, EQUILIBRIUM          302
FUEL CYCLE COST ANALYSIS      AI   7090  F2     RS P      D $ AIMFIRE, URANIUM          55
FUEL CYCLE COST AND ECONOMICS  CWE   360  F4     RS P    T D $ CINCAS, NUCLEAR            354
FUEL CYCLE COST AND ECONOMICS  WAPD 6600  F4     RS P    T D $ CINCAS, NUCLEAR            354
FUEL CYCLE COST CALCULATION   GGA  1108  F4     RS P    T D $ PWCOST, REACTOR            441
FUEL CYCLE COSTS PERFORMANCE DATA     ANL   360  F4     RS P      D $ NPRFCCP,           146
FUEL CYCLE COSTS PERFORMANCE DATA     UEC  6600  F4     RS P      D $ NPRFCCP,           146
FUEL CYCLE COSTS PERFORMANCE STUDY     GGA  7044  F4     RS P      D $ WAMPUM,            224
FUEL CYCLE COSTS PERFORMANCE STUDY     UEC  6600  F4     RS P      D $ WAMPUM,            224
FUEL CYCLE ECONOMICS  UICS  360  F4     RS P    CT D $ GEM, ANALYSIS OF NUCLEAR          576
FUEL CYCLE PARAMETERS FAST BREEDERS     NED   635  F4     RS P      D $ RAPFU,             372
FUEL ELEMENT        BAPL 6600  F4     RS      T I $ CYGRO2, STRESS ANALYSIS CYL          266
FUEL ELEMENT     AGC  7090  F2     RS P      B $ BOUNCE, FLUX DIST IN MULTI-PIN         237
FUEL ELEMENT ANALYSIS       BAPL 6600  F4     RS P    T H $ CLUB1, WATER-LOGGED          424
FUEL ELEMENT BEHAVIOR       ANL   360  F4     RS P    T I $ LIFE1, FAST REACTOR          460
FUEL ELEMENT HEAT TRANSFER CALC       ANC   360  F4     RSBP XCT H $ MOXY, BWR           551
FUEL ELEMENT HEAT TRANSFER CALC       ANC  1108  F4     RS P    T H $ MOXY, BWR          551
FUEL ELEMENT LIFETIME ANALYSIS          ANL  3600  F36    RSPP      I $ SWELL2,            353
FUEL ELEMENT STRESS ANALYSIS STUDY     GGA  7044  F4     RS P    T G $ ELBOW,             229
FUEL ELEMENTS   AEB   360  F4     RS P      B $ WELWING, MATERIAL BUCKLING CYL         362
FUEL MODEL  ANC   360  F4     RSBP    CT I $ FPFM, STEADY-STATE FISSION PRODUCT          584
FUEL PELLET TEMPERATURE & DEFORMATION   BAPL 6600  F4     RS P    T I $ PELEN,             598
FUEL PERFORMANCE FINITE-ELEMENT GESV  635  F4     RS P    CT I $ BEHAVE2, OXIDE            568
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FUEL PIN GAP CONDUCTANCE CALC BNW  1108  F4     RS P    T F $ GAPCON-THERMAL1,     618
FUEL ROD CLAD STRAIN & PELLET CRACKING BAPL 6600  F4     RS P      T $ STRIPE,     570
FUEL ROD STRESS & DEFORMATION     BAPL 6600  F4     RS P    T I $ CYGRO3, OXIDE     449
FUEL ROD STRESS & DEFORMATION     TVA   360  F4     RS P    T I $ CYGRO3, OXIDE     449
FUEL ROD THERMAL RESPONSE LOCA          ANC   360  F4     RSBP X T G $ THETA1-B,     512
FUEL SWELLING & GAS RELEASE SIMULATION  BAPL 6600  F4     RS P    T I $ BUBL1,       468
FUEL SWELLING TEMPERATURE STUDY    BAPL 6600  F4     RS P    T H $ FIGRO, LWBR      272
FUEL TEMPERATURE CODE GGA  7044  F4     RS        I $ CORE, CORE CONFIGURATION      233
FUEL TUBE BUNDLES  LASL 7094  F2     RSBP      H $ AXFLU, HEAT TRANSFER MOLTEN     182
FUEL TUBE BUNDLES  LASL 7094  F2     RSBP      H $ AXTHRM, HEAT TRANSFER SOLID     183
FUGIT, DYNAMIC RESPONSE OF ELASTIC STRUCTURES  BAPL 6600  F4     RS P    T I $      537
FUGUE, STEADY-STATE TEMPERATURE VOID FRACTION  AI   7090  F2     RS        I $       48
FULL-TEXT STORAGE, SEARCH & RETRIEVAL  SLA  1108  F+BAL RSBP    T M $ SPIRAL,      607
FULLY-IMPLICIT TRANSIENT SIMULATION    BAPL 6600  F4     RS P    T G $ FLASH4,      448
FULLY-IMPLICIT TRANSIENT SIMULATION    MA-G  360  F4     RSEP  CT G $ FLASH4,       448
FUMBLE, FAST REACTOR FUEL BURNUP & MANAGEMENT  NED   635  F4     RS P    T D $      480
FUNDAMENTAL MODE FAST REACTOR X-SEC CALC BNW  1108  F4     RS P    T B $ FCC4,        306
FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL   360  F4     RS P X T P $       610
FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL  1108  F5     RS P X T P $       610
FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL  6600  F4     RS P X T P $       610
FUSION REACTOR STUDY ANL   360  F4     RS P      X $ TOKMINA/TOKMINA2, TOKAMAK      561
F2     RS        A $ LYNNE, WOODS-SAXON POTENTIAL SHAPE CALCULATION ORNL 7090       381
F2     RS        B $ DANCOFF JR, MODERATOR SPACE CHORD DIST FUNCT   AEC  7090       150
F2     RS        B $ S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION    AI   7090        53
F2     RS        C $ FIRN, 2-D FEW-GP S4 APPROXIMATION RZ GEOMETRY  LLL   709         7
F2     RS        C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES   AI   7090        30
F2     RS        E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK  AI   7090       121
F2     RS        E $ SNAPKIN5/5A, 1-REGION KINETICS SNAP GEOMETRY   AI   7090       122
F2     RS        I $ CROCK, SPACE POWER PLANT DESIGN OPTIMIZATION   AI   7090       112
F2     RS        I $ FUGUE, STEADY-STATE TEMPERATURE VOID FRACTION  AI   7090        48
F2     RS        I $ SHOCK, SPACE POWER PLANT DESIGN OPTIMIZATION   AI   7090       114
F2     RS        J $ FARSE1A, DOSE RATE FROM SNAP SHIELD LEAKAGE    AI   7090        91
F2     RS        J $ MORTIMER, DOSE RATE CALCULATION SNAP GEOMETRY  AI   7090       142
F2     RS        J $ SCARF2, SCATTER FROM RADIATOR FINS SNAP GEOM   AI   7090       110
F2     RS        J $ SCAR1, SCATTER FROM A RING SNAP GEOMETRY       AI   7090       111
F2     RS        N $ WED, W-DSN OUTPUT TAPE EDIT REACTION RATES     UK-W 7090       133
F2     RS      T A $ SUMMIT, CRYSTALLINE SCATTERING KERNEL CALC     GGA  7090        56
F2     RS  L   T C $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION     AI   7090        58
F2     RS P      A $ DOPIE, RESOLVED RESONANCE X-SECTION CALC       NEC  2000       177
F2     RS P      A $ EXT, X-SECTIONS FROM B-W RESONANCE PARAMETERS  WANL 7094       238
F2     RS P      A $ RAPTURE, RESONANCE INTEGRAL X-SECTION CALC     NEC  2000       176
F2     RS P      B $ BAM, S4 CYL CELL CODE AND TEMPEST COMBINATION  AI   7090       108
F2     RS P      B $ BOUNCE, FLUX DIST IN MULTI-PIN FUEL ELEMENT    AGC  7090       237
F2     RS P      B $ SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY  AI   7090        52
F2     RS P      B $ SPARTA, SPATIALLY-AVERAGED DOPPLER EFFECTS     NEC  2000       178
F2     RS P      C $ MIST, 1-D FEW-GP SN DOUBLE SN APPROX SLAB GEOM PPCO 7090        59
F2     RS P      D $ AIMFIRE, URANIUM FUEL CYCLE COST ANALYSIS      AI   7090        55
F2     RS P      F $ CONEC, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE LLL  7090       129
F2     RS P      F $ WEAK EXPLOSION, COUPLED NEUTRON-HYDRODYNAMICS  APDA 7094       145
F2     RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD        AI   7090        47
F2     RS P      H $ BIGDEAL, SPENT YANKEE-FUEL TEMPERATURE CALC    ORNL 1604       549
F2     RS P      H $ FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW     AI   7094       246
F2     RS P      J $ GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY    AI   7090        45
F2     RS P      J $ GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM  AI   7090        46
F2     RS P      J $ RATRAP, DOSE RATE CALCULATION SNAP GEOMETRY    AI   7090       141
F2     RS P      O $ CROC90, ML-1 FLUID FLOW EXPERIMENT ANALYSIS    AGC  7090       154
F2     RS P      P $ EXPALS, LEAST SQUARES EXPONENTIAL DECAY CURVES LLL  7094       321
F2     RS P      P $ FRANTIC, LEAST SQUARES FIT SUM OF EXPONENTIALS MIT  7090       324
F2     RS P    T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS  AI   7094       254
F2     RS P    T B $ AGN-SIGMA, CALC OF MULTI-GP TRANSFER MATRICES  AGC  7090       243
F2     RS P    T C $ EQUIPOISE3, 2-D 2-GROUP DIFFUSION SLAB CYL     ORNL 7090        39
F2     RS P    T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB  ORNL 7090        87
F2     RS P    T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE AI   7090        28
F2     RS P    T C $ TOPIC, 1-D FEW-GP SN APPROXIMATION CYLINDER    PPCO 7090       148
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F2									F4	
F2	RS	P	T	C	$	W-DSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE	UK-W	7090		132
F2	RS	P	T	C	$	WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY	ORNL	7090		32
F2	RS	P	T	C	$	2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER	ORNL	7090		40
F2	RS	P	T	G	$	TRANS-FUGUE1, TRANSIENT FLOW AND HEAT TRANSFER	AI	7094		268
F2	RS	PL	T	A	$	ARES2, RESONANCE INTEGRAL X-SECTION CALC	AI	7090		89
F2	RS	PL	T	B	$	FORM, FAST NEUTRON SPECTRUM X-SECTION CALC	AI	7090		51
F2	RS	PL	T	I	$	CYCLOPS1, THERMODYNAMIC CYCLE ANALYSIS	AI	7094		244
F2	RS	PLX	T	B	$	GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC	GGA	7090		33
F2	RS	PLX	T	C	$	DTF2, 1-D MULTI-GP DISCRETE ORDINATE CALC	AI	7090		151
F2	RSB			F	$	HATCHET, COUPLED NEUTRONICS-HYDRODYNAMICS CODE	AGC	7090		153
F2	RSP		T	D	$	FEVER, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM	GGA	7090		117
F2	RSBP			D	$	ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS	ORNL	7090		180
F2	RSBP			D	$	NUCY, SOLUTION OF NUCLIDE CHAIN EQUATIONS	ORNL	7090		134
F2	RSBP			H	$	AXFLU, HEAT TRANSFER MOLTEN FUEL TUBE BUNDLES	LASL	7094		182
F2	RSBP			H	$	AXTHPM, HEAT TRANSFER SOLID FUEL TUBE BUNDLES	LASL	7094		183
F2	RSBP			J	$	LIPRECAN1, MC NEUTRON PENETRATION CALCULATION	DAC	7090		123
F2	RSBP		T	H	$	PTH1, BLOWDOWN PRESSURE TEMPERATURE HISTORY	KE	7094		155
F2	RSBPL		T	J	$	MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY	BNW	7090		143
F36	SBP			I	$	BOW2, DEFLECTION CALCULATION PARALLEL BEAMS	ANL	3600		365
F36	RS	P		G	$	DISPER, AEROSOL PARTICLE TRANSPORT STUDY	RFD	3600		554
F36	RS	P	T	B	$	MC**2, ENDF MULTIGROUP X-SECTION CALCULATION	ANL	3600		355
F36	RS	P	T	C	$	SNARG-1D, 1-D MULTI-GP DISCRETE ORDINATE CALC	ANL	3600		288
F36	RS	P	T	I	$	SUPORAN, REACTOR CORE SUPPORT STRESS ANALYSIS	ANL	3600		357
F36	RS	P	T	S	$	TOODY2, 2-D LAGRANGIAN EQNS OF MOTION SOLUTION	SLA	3600		627
F36	RS	P	X T	C	$	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	ANL	3600		262
F36	RS	P	XCT	C	$	TESS, 1-D SLAB AND SPHERE GEOM SN TRANSPORT	ANL	3600		513
F36	RSBP			A	$	MISH-MASH, RESONANCE INTEGRAL CALC HOMOGENEOUS	ANL	3600		214
F36	RSBP			G	$	CHEMLOC2, CORE HEATING CLADDING-STEAM REACTION	ANL	3600		366
F36	RSBP			G	$	WHAM, LIQUID-FILLED PIPING SYSTEM ANALYSIS	KE	3600B		278
F36	RSBP			I	$	SWELL2, FUEL ELEMENT LIFETIME ANALYSIS	ANL	3600		353
F36	RSBP	X	T	B	$	RABBLE,WLIB,FLAT, RESONANCE ABSORPTION, CELL	ANL	3600		281
F36	RSBP	X	T	B	$	RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG CELL	ANL	3600		213
F4	S		T	D	$	GAFFE, EQUILIBRIUM FUEL CYCLE CALCULATION	GGA	1108		302
F4	S	P		H	$	PWR-PPM, BORATION-DILUTION TABLES FOR PWR OPN	CPFD	6400		552
F4	RS			A	$	STRIP, RESOLVED RESONANCE INTEGRAL CALCULATION	BW	2000		305
F4	RS			B	$	APREX1, 99-GP DLC-2B LIBRARY GROUP COLLAPSING	APRF	6600		466
F4	RS			B	$	HEXSCAT, ELASTIC SCAT X-SECTIONS HEX LATTICE	GGA	1108		291
F4	RS			E	$	R102, SPACE-INDEPENDENT INVERSE KINETICS CALC	WANL	7094		168
F4	RS			G	$	ANVENT, LOCA ANALYSIS DUKE POWER MCGUIRE UNITS	DUCO	635		529
F4	RS			I	$	CORE, CORE CONFIGURATION FUEL TEMPERATURE CODE	GGA	7044		233
F4	RS			I	$	SORSDB, PRESSURE VESSEL STRESS AND FATIGUE	KAPL	6600		391
F4	RS			M	$	MERMC2, MC**2 BINARY LIBRARY TAPE MAINTENANCE	ANL	360		472
F4	RS		T	B	$	MO807, 2-D DIFFUSION ABSORPTION REMOVAL X-SECS	BAPL	6600		280
F4	RS		T	C	$	EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM	BC	625		156
F4	RS		T	C	$	FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE	BC	625		28
F4	RS		T	C	$	MO648, 1-D SLAB TRANSPORT WITH SLOWING DOWN	BAPL	6600		342
F4	RS		T	G	$	GADOSE,DOSET, HTGR ACCIDENT ANALYSIS DOSE CALC	GGA	1108		261
F4	RS		T	H	$	RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS	LASL	7030		242
F4	RS		T	H	$	STEAM-67, 1967 ASME STEAM AND WATER PROPERTIES	BG&E	360B		487
F4	RS		T	H	$	WATER, STEAM TABLES 14.5-14,500PSIA 32-472DEGF	BAPL	6600		267
F4	RS		T	I	$	CYGRO2, STRESS ANALYSIS CYL FUEL ELEMENT	BAPL	6600		266
F4	RS		T	M	$	CHECKER,CRECT,CAMMET,PLOTFB,... ENDF/B V1 PROC	BNL	6600B		384
F4	RS		T	M	$	CHECK3,RIGEL3, ENDF/B V3 PROCESSING CODES	BNL	6600		571
F4	RS		T	M	$	CRECT,CHECKER,RIGEL,PLOTFB,... ENDF/B V2 PROC	BNL	6600B		475
F4	RS		T	M	$	RIGEL, ENDF/B V3 DATA PROCESSING CODE	ANL	360		571
F4	RS		T	M	$	RIGEL4,CHECK4,... ENDF/B V4 PROCESSING CODES	BNL	6600B		638
F4	RS		T	G	$	GASPAN, COMPLEX GAMMA-RAY SPECTRA ANALYSIS	KAPL	6600		485
F4	RS		T	P	$	LASL LEAST SQUARES, GENERAL CURVE FITTING	LASL	7094		62
F4	RS		T	P	$	MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE2.0	CEND	7600B		478
F4	RS		X T	G	$	PRECON, HTGR CONTAINMENT PRESSURE POST RUPTURE	GGA	7044		228
F4	RS		X T	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	635		534
F4	RS		X T	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	1108		534
F4	RS		X T	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	6600		534
F4	RS	L	T	B	$	GAMB1T, X-SEC GENERATION FOR TRANSPORT CODES	WANL	6600		547

F4	RS	L	T	B	$	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA	GGA	6600	298
F4	RS	L	T	C	$	FIRE5, 1-D AGE-DIFFUSION SLAB CYLINDER SPHERE	AEB	360	9
F4	RS	P		A	$	AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC	BNL	6600	376
F4	RS	P		A	$	AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC	BNL	7094	376
F4	RS	P		A	$	BESFIT, DIFFRACTION MODEL ELASTIC SCAT X-SEC	BNL	6600	524
F4	RS	P		A	$	CLEM, ANGULAR DISTRIBUTION LEGENDRE FITTING	KAPL	6600	531
F4	RS	P		A	$	CODILLI, LEAST SQUARES ANALYSIS RESONANCE DATA	UILL	360	347
F4	RS	P		A	$	GAKER, INELASTIC SCAT X-SECTION CALC MODERATOR	GGA	1108	289
F4	RS	P		A	$	GASKET, THERMAL SCATTERING LAW CALCULATION	GGA	1108	263
F4	RS	P		A	$	GRAMP, R-M PARAMETERS OF UNRESOLVED RESONANCES	BAPL	6600	470
F4	RS	P		A	$	MULTI, MULTI-LEVEL RESONANCE THEORY XSEC CALC	KAPL	6600	535
F4	RS	P		A	$	POLLA, CONVERTS R-MATRIX RESONANCE PARAMETERS	ORNL	360	639
F4	RS	P		A	$	PSEUDO, STATISTICAL RESONANCE PARAMETER CALC	ENEA	360	292
F4	RS	P		A	$	PSEUDO, STATISTICAL RESONANCE PARAMETER CALC	GGA	1108	292
F4	RS	P		A	$	RAMP1, REICH-MOORE RESOLVED REGION X-SECTIONS	BNL	6600	492
F4	RS	P		A	$	SIGPLOT, RESOLVED MULTILEVEL B-W X-SEC CALC	BNL	6600	377
F4	RS	P		A	$	THRESH, STATISTICAL MODEL REACTION X-SECTIONS	BNL	6600	504
F4	RS	P		B	$	AVOID, ANNULAR VOID X-SECTION CALCULATION	GEC	625	276
F4	RS	P		B	$	GAMMA-P, PRODUCTION X-SECTIONS FOR GAMMA-RAYS	GEC	7094	235
F4	RS	P		B	$	PARTI, OPTIMAL GROUP OR MESH COLLAPSING	TRW	6500	416
F4	RS	P		B	$	WELWING, MATERIAL BUCKLING CYL FUEL ELEMENTS	AEB	360	362
F4	RS	P		C	$	PERT, 1-D PERTURBATION FOR AIM AND FOG CODES	BHSC	360	30
F4	RS	P		C	$	PERT4, 2-D PERTURBATION XY RZ RTHETA GEOMETRY	BNW	1108	304
F4	RS	P		D	$	CINDER,M0102, POINT DEPLETION FISSION PRODUCT	BAPL	6600	313
F4	RS	P		D	$	FREVAP6, HTGR METALLIC FISSION PRODUCT RELEASE	GGA	1108	301
F4	RS	P		D	$	NPREOCP, FUEL CYCLE COSTS PERFORMANCE DATA	ANL	360	146
F4	RS	P		D	$	NPREOCP, FUEL CYCLE COSTS PERFORMANCE DATA	UEC	6600	146
F4	RS	P		D	$	POWERCO, NUCLEAR STATION ELECTRICITY COSTS	UEC	6600	340
F4	RS	P		D	$	RAD2, HTGR FISSION PRODUCT ACTIVITY DIST STUDY	GGA	7044	231
F4	RS	P		D	$	RAPFU, FUEL CYCLE PARAMETERS FAST BREEDERS	NFC	635	372
F4	RS	P		D	$	WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY	GGA	7044	224
F4	RS	P		D	$	WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY	UEC	6600	224
F4	RS	P		E	$	AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK	AEB	360	121
F4	RS	P		E	$	BLAST, REACTOR KINETICS TEMPERATURE DIST STUDY	AEB	360	363
F4	RS	P		E	$	GAPOTKIN, SPACE-INDEPENDENT REACTOR KINETICS	GGA	1108	317
F4	RS	P		F	$	GASA, STABILITY ANALYSIS REACTOR KINETICS EQNS	GGA	1108	290
F4	RS	P		E	$	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	ANL	360	255
F4	RS	P		F	$	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	WANL	7094	255
F4	RS	P		E	$	R102, SPACE-INDEPENDENT INVERSE KINETICS CALC	ANL	360	168
F4	RS	P		E	$	TRIFIDO, PULSED NEUTRON SOURCE DATA ANALYSIS	CNEA	360	489
F4	RS	P		F	$	MARS, 2-D EXCURSION CALCULATION R-Z GEOMETRY	APDA	7094	293
F4	RS	P		F	$	RAUMZEIT, 1-D TIME-DEPENDENT DIFFUSION CALC	KAPL	6600	352
F4	RS	P		F	$	STINT3, SINGLE-CHANNEL SPACE-TIME SYNTHESIS	KAPL	6600	389
F4	RS	P		F	$	TWIGGLE, 2-D 2-GP SPACE-TIME DIFFUSION	ANL	360	338
F4	RS	P		G	$	CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD	DP	360	47
F4	RS	P		G	$	EGAD, CALC OF EXTERNAL GAMMA DOSE INTEGRALS	DP	360	600
F4	RS	P		G	$	FRCPL2, LOCA FISSION PRODUCT RELEASE ANALYSIS	BCL	6400	500
F4	RS	P		G	$	INTEG,INSPEC, MARKOV SIMULATION OF REACTOR OPN	DP	360	590
F4	RS	P		G	$	SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS	ANL	360	521
F4	RS	P		G	$	SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS	HEDL	1108	521
F4	RS	P		G	$	WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS LOFT	UGA	360	278
F4	RS	P		H	$	FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW	MSS	360	246
F4	RS	P		H	$	PLENUM, FLOW DIST. IN CYL COOLANT INLET PLENUM	DP	360	586
F4	RS	P		H	$	RAPP, HIGH-VELOCITY FLOW STUDY STEAM-WATER MIX	KAPL	6600	382
F4	RS	P		I	$	GAZELLE5, GAS-COOLED CORE THERMAL DESIGN STUDY	GGA	7044	232
F4	RS	P		I	$	NUROW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	360B	643
F4	RS	P		I	$	SAFE-CREEP, VISCOELASTIC ANALYSIS CONCRETE	GGA	1108	300
F4	RS	P		I	$	SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES	GGA	1108	252
F4	RS	P		I	$	SAFE-SHELL, STRESS ANALYSIS THIN SHELLS	GGA	1108	253
F4	RS	P		I	$	SAFE-2D, PLANE & AXISYMMETRIC STRESS ANALYSIS	GGA	1108	379
F4	RS	P		I	$	STEM, MATRIX GENERATION FOR A SYSTEM OF BEAMS	KAPL	6600	337
F4	RS	P		I	$	STRIPE, FUEL ROD CLAD STRAIN & PELLET CRACKING	BAPL	6600	570
F4	RS	P		I	$	TCB01, CREEP-BUCKLING OF TUBES UNDER PRESSURE	BAPL	6600	604
F4	RS	P		I	$	TUBE, U-TUBE HEAT EXCHANGER STRESS ANALYSIS	KAPL	6600	378

F4	RS	P		L	$	GAVER, ENERGY INTERVAL X-SECTION AVERAGING	GGA	7044	218
F4	RS	P		L	$	GENRD, FREE-FORMAT CARD INPUT PROCESSOR	LASL	360	530
F4	RS	P		L	$	GENRD, FREE-FORMAT CARD INPUT PROCESSOR	LASL	6600	530
F4	RS	P		L	$	GRDWRK, GRID GENERATION FOR SAFE PROGRAMS	GGA	1108	296
F4	RS	P		N	$	DAC1, SN PERTURBATION CODE USING DTF4 FLUXES	LASL	6600	455
F4	RS	P		N	$	HEATMESH, GEOMETRICAL DATA HEAT TRANSFER STUDY	SLL	6600	434
F4	RS	P		N	$	LARCA, FLUX-WEIGHTING OF DTF4 CROSS SECTIONS	LASL	6600	409
F4	RS	P		O	$	ALPHA-M, RESOLUTION OF GAMMA RAY SPECTRA	ORNL	360	413
F4	RS	P		O	$	CORGAM, UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA	KSUN	360	390
F4	RS	P		O	$	DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	ANL	360	464
F4	RS	P		O	$	DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	KAPL	6600	464
F4	RS	P		P	$	BH99, EXTREME VALUE DISTRIBUTION DATA ANALYSIS	BAPL	6600	621
F4	RS	P		P	$	ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	6600	601
F4	RS	P		P	$	FORSIM, SOLN OF SYSTEM OF ORDINARY DIFF EQNS	ORNL	6600	514
F4	RS	P		P	$	GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER	LLL	6600B	592
F4	RS	P		P	$	KEELE, LINEARLY-CONSTRAINED OPTIMIZATION	ORNL	360	556
F4	RS	P		P	$	MOST, A MULTIDIMENSIONAL OPTIMIZATION SCHEME	KAPL	6600	446
F4	RS	P		P	$	PLOTR, 2D CONTOUR PLOTS & AREA CALCULATION	SLA	6600	578
F4	RS	P		P	$	RELO1, RELIABILITY FOR A SINGLE FAILURE MODE	BAPL	6600	497
F4	RS	P		P	$	ROPE, FINDING ROOTS OF A POLYNOMIAL	KAPL	6600	444
F4	RS	P		U	$	DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD	360	645
F4	RS	P		V	$	FFEARS, LAPLACE EQUATION ISOTROPIC DIELECTRICS	SLA	6600	577
F4	RS	P		W	$	MMM3, COORDINATE ANALYSES SEMI-RIGID MOLECULES	ANC	360	632
F4	RS	P		X	$	TOKMINA/TOKMINA2, TOKAMAK FUSION REACTOR STUDY	ANL	360	561
F4	RS	P	T	A	$	ATHENA4, INELASTIC SCATTERING FORM FACTORS	ORNL	360	417
F4	RS	P	T	A	$	GANDY3, UNRESOLVED RESONANCE X-SECTION CALC	GGA	1108B	341
F4	RS	P	T	A	$	JP1XR, COUPLED-CHANNEL SCATTERING X-SEC CALC	KAPL	6600	506
F4	RS	P	T	A	$	PHASER, PHASE SHIFT X-SEC & POLARIZATION CALC	KAPL	6600	507
F4	RS	P	T	A	$	PUN1, UNRESOLVED RESONANCE INTEGRALS X-SECS	BAPL	6600	359
F4	RS	P	T	A	$	RESEND,ACLER, ENDF/B RESONANCE XSECTION CODES	BNL	6600B	465
F4	RS	P	T	A	$	SUMOR, S-WAVE NEUTRON X-SECTION CALCULATION	BAPL	6600	399
F4	RS	P	T	A	$	TACASI, ANALYSIS OF RESONANCE MEASUREMENTS	GGA	1108	410
F4	RS	P	T	A	$	TOR, THERMAL SCATTERING CRYSTALLINE MATERIALS	LASL	6600	360
F4	RS	P	T	B	$	CLUP77, SQUARE CELL COLLISION PROBABILITY CALC	ANL	360	526
F4	RS	P	T	B	$	CLUP77, SQUARE CELL COLLISION PROBABILITY CALC	JAER	230	526
F4	RS	P	T	B	$	EPOCH, NEUTRON AGE CALCULATION OF ENDF/B DATA	BAPL	6600	461
F4	RS	P	T	B	$	ETOG3, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT	WAPD	7600	538
F4	RS	P	T	B	$	ETOM1, ENDF/B FORMAT TO MUFT FORMAT X-SECTIONS	WAPD	6600	436
F4	RS	P	T	B	$	ETOT2, THERMAL LIBRARIES FROM ENDF/B DATA	WAPD	7600	509
F4	RS	P	T	B	$	ETOT3, ENDF/B V3 DATA TO THERMAL LIBRARY FORM	WAPD	7600	628
F4	RS	P	T	B	$	FCC4, FUNDAMENTAL MODE FAST REACTOR X-SEC CALC	BNW	1108	306
F4	RS	P	T	B	$	FMC-N, MONTE CARLO CALC NEUTRON HISTORIES	GGA	7044	195
F4	RS	P	T	B	$	GLEN, GROUP CONSTANT CALC FROM TOR OUTPUT DATA	LASL	6600	361
F4	RS	P	T	B	$	REAX, RESOLVED RESONANCE EPITHERMAL X-SECTIONS	NEC	635	257
F4	RS	P	T	B	$	RICE, PRIMARY RECOIL ATOM SPECTRA ENDF/B DATA	ORNL	360	453
F4	RS	P	T	B	$	SUPERTOG, ENDF/B FINE-GP CONSTANTS GENERATION	ORNL	360	431
F4	RS	P	T	C	$	BE21, FEW-GP DISCRETE ORDINATES SLAB GEOMETRY	BAPL	6600	398
F4	RS	P	T	C	$	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC	NEC	1108	287
F4	RS	P	T	C	$	DOT2DB, 2-D MULTIGROUP DIFFUSION & SN THEORY	NEC	635	459
F4	RS	P	T	C	$	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LASL	6600	209
F4	RS	P	T	C	$	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LASL	7030	209
F4	RS	P	T	C	$	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LER	7094	209
F4	RS	P	T	C	$	EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM	CE	6600	156
F4	RS	P	T	C	$	EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM	ORNL	360	156
F4	RS	P	T	C	$	FAIMOS, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	BHSC	360	120
F4	RS	P	T	C	$	FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION	NEC	635	167
F4	RS	P	T	C	$	GASP2, 1-D FEW-GP DIFFUSION POWER DIST SEARCH	GGA	7044	220
F4	RS	P	T	C	$	GASP7, 1-D BURNUP POWER DISTRIBUTION SEARCH	GGA	1108	319
F4	RS	P	T	C	$	GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z MESH	GGA	1108	380
F4	RS	P	T	C	$	HFN, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	BNW	1107	241
F4	RS	P	T	C	$	KEFF,MGBS,TGAN, NUCLEAR CRITICALITY SAFETY	DP	360	617
F4	RS	P	T	C	$	TEMCO, 1-D FEW-GP DIFFUSION TEMP COEF CALC	GGA	7044	225
F4	RS	P	T	C	$	TEMCO7, TEMPERATURE COEFFICIENT CALCULATION	GGA	1108	320
F4	RS	P	T	C	$	TOPIC, 1-D FEW-GP SN APPROXIMATION CYLINDER	PPCO	7040	148

F4	RS	P	T	C	$	TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM	LASL	6600	608
F4	RS	P	T	C	$	TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM	LASL	7600	608
F4	RS	P	T	C	$	TWOTRAN-PNVW, 2-D PARTICLE TRANSPORT XY RZ RTH	LASL	7600	573
F4	RS	P	T	C	$	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	6600C	358
F4	RS	P	T	C	$	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	7600D	358
F4	RS	P	T	C	$	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	UMCC	360	212
F4	RS	P	T	C	$	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	WANL	6600	212
F4	RS	P	T	C	$	3DDT, 3-D MULTIGROUP DIFFUSION XYZ R-THETA-Z	LASL	6600	463
F4	RS	P	T	D	$	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	CWE	360	354
F4	RS	P	T	D	$	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	WAPD	6600	354
F4	RS	P	T	D	$	DTF-BURN, 1-D MULTI-GP DTF4 WITH DEPLETION	LASL	7030	269
F4	RS	P	T	D	$	FEVER7, 1-D MULTIGROUP DIFFUSION AND DEPLETION	GGA	1108	318
F4	RS	P	T	D	$	FUMBLE, FAST REACTOR FUEL BURNUP & MANAGEMENT	NEC	635	480
F4	RS	P	T	D	$	GARGOYLE, FUEL CYCLE ANALYSIS PARTIAL REFUEL	GGA	7044	260
F4	RS	P	T	D	$	GAUGE, 2-D FEW-GP HEX GEOM DIFFUSION DEPLETION	GGA	1108	339
F4	RS	P	T	D	$	ORCOST, POWER PLANT CAPITAL COST ESTIMATING	ORNL	360B	588
F4	RS	P	T	D	$	PHENIX, 2D DIFFUSION BURNUP REFUELING HISTORY	LASL	6600	454
F4	RS	P	T	D	$	PWCOST, REACTOR FUEL CYCLE COST CALCULATION	GGA	1108	441
F4	RS	P	T	D	$	RELOAD-FEVER, 1-D FEW-GP DIFFUSION DEPLETION	GGA	7044	221
F4	RS	P	T	D	$	REVISED-GAD, FUEL CYCLE ANALYSIS W/REFUELING	GGA	7044	223
F4	RS	P	T	D	$	STMGEN, STEAM GENERATOR DESIGN CRITERIA COSTS	GGA	7044	227
F4	RS	P	T	D	$	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	BNW	1108	325
F4	RS	P	T	D	$	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	LASL	6600	325
F4	RS	P	T	D	$	3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS	HEDL	1108	567
F4	RS	P	T	D	$	3DXT,DEP3, 3-D XENON TRANSIENT & DEPLETION	KAPL	6600	477
F4	RS	P	T	E	$	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	ANL	360	486
F4	RS	P	T	E	$	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	LASL	6600	486
F4	RS	P	T	F	$	ADEP, 1D AND 2D FEW-GROUP SPACE-TIME KINETICS	BCL	6400	494
F4	RS	P	T	F	$	FORE, FAST REACTOR EXCURSION CALCULATIONS	NEC	2000	174
F4	RS	P	T	F	$	GAKIN2, 1D MULTIGROUP TIME-DEPENDENT DIFFUSION	MIT	370	310
F4	RS	P	T	F	$	GAKIT, 1-D MULTIGP KINETICS WITH TEMP FEEDBACK	GGA	1108	370
F4	RS	P	T	F	$	NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK	BNL	6600	405
F4	RS	P	T	F	$	NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES	BNW	7090	488
F4	RS	P	T	F	$	NOWIG, 1-D 2-GP KINETICS TEMPERATURE FEEDBACK	BAPL	6600	371
F4	RS	P	T	F	$	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	360	400
F4	RS	P	T	F	$	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	6600	400
F4	RS	P	T	F	$	TSN, SPATIALLY-DEPENDENT REACTOR KINETICS	AI	360	309
F4	RS	P	T	F	$	TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK	BAPL	6600	338
F4	RS	P	T	F	$	WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	BAPL	6600	274
F4	RS	P	T	F	$	WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	GGA	1108	274
F4	RS	P	T	G	$	AISITE2, PARAMETRIC SITE REQUIREMENT STUDY	AI	360	172
F4	RS	P	T	G	$	CEBUG, STEAM GENERATOR SODIUM-WATER REACTION	CEND	7600	548
F4	RS	P	T	G	$	ECCSA4, LOSS-OF-COOLANT & EMERGENCY COOLING	BCL	6400	330
F4	RS	P	T	G	$	ELBOW, FUEL ELEMENT STRESS ANALYSIS STUDY	GGA	7044	229
F4	RS	P	T	G	$	FLASH3, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	6600	295
F4	RS	P	T	G	$	FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION	BAPL	6600	448
F4	RS	P	T	G	$	FREADM1, FAST REACTOR CORE ACCIDENT ANALYSIS	NEC	635	479
F4	RS	P	T	G	$	HAA3, COAGULATION OF HETEROGENEOUS AEROSOLS	AI	360	443
F4	RS	P	T	G	$	MO555,ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	6600	284
F4	RS	P	T	G	$	NURLOC-1.0, LOSS-OF-COOLANT THERMAL ANALYSIS	BCL	6400	328
F4	RS	P	T	G	$	PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES	ANC	1108	528
F4	RS	P	T	G	$	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	1108	369
F4	RS	P	T	G	$	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	6600	369
F4	RS	P	T	G	$	SOFIRE2, SODIUM POOL FIRE 1- & 2-CELL ANALYSIS	AI	360	559
F4	RS	P	T	H	$	ASTEM, THERMODYNAMIC PROPERTIES WATER & STEAM	ANC	360	580
F4	RS	P	T	H	$	CHIC-KIN, FAST + INTERMEDIATE POWER TRANSIENTS	BAPL	6600	473
F4	RS	P	T	H	$	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	360C	432
F4	RS	P	T	H	$	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	1108C	432
F4	RS	P	T	H	$	COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS	BNW	6600C	432
F4	RS	P	T	H	$	DYNAM, DYNAMIC ANALYSIS BOILING FLOW STEAM	GGA	1108	440
F4	RS	P	T	H	$	FIGRO, LWBR FUEL SWELLING TEMPERATURE STUDY	BAPL	6600	272
F4	RS	P	T	H	$	FLOT1,MO219, PWR FLOW TRANSIENT ANALYSIS	BAPL	6600	331
F4	RS	P	T	H	$	GAPCON-THERMAL1, FUEL PIN GAP CONDUCTANCE CALC	BNW	1108	618
F4	RS	P	T	H	$	GLUB1, WATER-LOGGED FUEL ELEMENT ANALYSIS	BAPL	6600	424

F4	RS	P	T H	$	HAFMAT, SYSTEM STEADY-STATE FLOW DISTRIBUTION	KAPL	6600	616
F4	RS	P	T H	$	HEATING3, 1,2, OR 3-D HEAT CONDUCTION PROGRAM	ORNL	360	517
F4	RS	P	T H	$	HOT2, 2-D TRANSIENT HEAT CONDUCTION PROGRAM	BAPL	6600	286
F4	RS	P	T H	$	LION, 3-D TEMPERATURE DISTRIBUTION PROGRAM	CHI	1108	299
F4	RS	P	T H	$	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS	NEC	635	256
F4	RS	P	T H	$	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS	WARD	6600	256
F4	RS	P	T H	$	MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC	ANC	1108	551
F4	RS	P	T H	$	MC899,HOH, STEAM TABLES 14.5-2538 PSIA	BAPL	6600	294
F4	RS	P	T H	$	ORRIBLE, ROD BUNDLE FLOW & TEMPERATURE DIST.	ORNL	360	629
F4	RS	P	T H	$	TOPS, TRANSIENT THERMODYNAMICS OF PRESSURIZERS	BAPL	6600	348
F4	RS	P	T H	$	VELVET2, TURBULENT FLOW IN LMFBR ROD BUNDLE	NEC	635	458
F4	RS	P	T H	$	WASP, WATER AND STEAM THERMODYNAMIC PROPERTIES	BAPL	6600	396
F4	RS	P	T I	$	BUBL1, FUEL SWELLING & GAS RELEASE SIMULATION	BAPL	6600	468
F4	RS	P	T I	$	BUSHL, CYL SHELL BUCKLING COLLAPSE ANALYSIS	BAPL	6600	481
F4	RS	P	T I	$	CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION	BAPL	6600	449
F4	RS	P	T I	$	CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION	TVA	360	449
F4	RS	P	T I	$	FUGIT, DYNAMIC RESPONSE OF ELASTIC STRUCTURES	BAPL	6600	537
F4	RS	P	T I	$	LIFE1, FAST REACTOR FUEL ELEMENT BEHAVIOR	ANL	360	460
F4	RS	P	T I	$	MANE1, RECTANGULAR MAGNETIC NETWORK SOLUTION	BAPL	6600B	412
F4	RS	P	T I	$	MO266, LINEAR ELASTIC STRUCTURAL DYNAMICS	BAPL	6600	383
F4	RS	P	T I	$	MO457,PIPE, ELASTIC STRESS OF PIPING SYSTEM	BAPL	6600	329
F4	RS	P	T I	$	MO552, DYNAMIC ANALYSIS LINEAR ELASTIC SYSTEMS	BAPL	6600	283
F4	RS	P	T I	$	PELEN, FUEL PELLET TEMPERATURE & DEFORMATION	BAPL	6600	598
F4	RS	P	T I	$	SABOR4, DISCRETE-ELEMENT ANALYSIS THIN SHELLS	MIT	360	402
F4	RS	P	T I	$	SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC LOAD	GGA	7044	251
F4	RS	P	T I	$	SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES	BNL	6600	252
F4	RS	P	T I	$	SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY	GGA	1108	332
F4	RS	P	T I	$	SEAL SHELL, SHELL STRESS ANALYSIS AXISYM LOAD	WTSC	6600B	282
F4	RS	P	T I	$	SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD	BAPL	6600	282
F4	RS	P	T I	$	SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD	SR	360	282
F4	RS	P	T I	$	SLADE-D, DYNAMIC ANALYSIS OF THIN SHELLS	SLA	6600	581
F4	RS	P	T I	$	SCR3, STRESS ANALYSIS SHELLS OF REVOLUTION	KAPL	6600C	80
F4	RS	P	T J	$	MUSCAT, VIEW FACTOR SHIELDING CODE CAVITY GEOM	GGA	1108	259
F4	RS	P	T J	$	MU756,LETC, 1-D SLAB GAMMA-RAY TRANSPORT	BAPL	6600	343
F4	RS	P	T K	$	CITATION, 1,2,3-D DIFFUSION DEPLETION MULTIGP	ORNL	360H	387
F4	RS	P	T L	$	BL47, DRAFTING TOOL TO PLOT PLANE STRUCTURES	BAPL	6600	373
F4	RS	P	T L	$	QMESH,RENUM, SELF-ORGANIZING MESH GENERATION	SLA	6600	612
F4	RS	P	T M	$	CRECT,CHECKER, ENDF/B V2 PROCESSING CODES	ANL	360	475
F4	RS	P	T M	$	EDITOR, ENDF/B TAPE PROCESSING AND EDITING	ORNL	6600	502
F4	RS	P	T M	$	SHLOG, DATA MANAGEMENT, EDITING, & ANALYSIS	BAPL	6600	557
F4	RS	P	T M	$	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE	NED	635	493
F4	RS	P	T N	$	PLOT-3D, 3-D PLOTS ON IBM2280 OR CALCOMP780	ANL	360	544
F4	RS	P	T O	$	BETTY, ENTRAINED PARTICLES SAMPLING STUDY	BAPL	6600	545
F4	RS	P	T O	$	BURNUP, HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS	NEC	635	311
F4	RS	P	T O	$	EXPN, ANALYSIS OF PULSED NEUTRON SOURCE DATA	NEC	635	258
F4	RS	P	T O	$	JITER, FLUCTUATION EXPERIMENT ANALYSIS	BAPL	6600	394
F4	RS	P	T O	$	REDUX, REACTOR FLUCTUATION EXPERIMENT ANALYSIS	BAPL	6600	425
F4	RS	P	T P	$	CAFT1, LEAST SQUARES FIT FISSILE NUCLIDE DATA	BAPL	6600	327
F4	RS	P	T P	$	MO661,MO657,MO626, POLYNOMIAL CURVE FITTING	BAPL	6600	411
F4	RS	P	T Q	$	GROUP2, GROUP THEORY OF LATTICE DYNAMICS	ANL	360	620
F4	RS	P	T Q	$	GROUP2, GROUP THEORY OF LATTICE DYNAMICS	LASL	6600	620
F4	RS	P	T Q	$	RESPOND, DISSIMILAR MEDIA TLD CORRECTION CALC	AI	360	566
F4	RS	P	C G	$	STEFEG, ANALYSIS OF PWR & BWR GASEOUS RELEASE	ORNL	360	583
F4	RS	P	C P	$	GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER	ANL	360B	592
F4	RS	P	CT A	$	JUPITOR1, COUPLED CHANNEL X-SEC EVALUATION	ENEA	360	308
F4	RS	P	CT B	$	MC**2, ENDF MULTIGROUP X-SECTION CALCULATION	ANL	360	355
F4	RS	P	CT C	$	FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION	MSS	360	167
F4	RS	P	CT C	$	TRIAL, 3-D REACTION RATES FROM 2-D FLUX SETS	GESV	H600	585
F4	RS	P	CT D	$	GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	UICS	360	576
F4	RS	P	CT D	$	3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS	ANL	360	567
F4	RS	P	CT F	$	REXCO-H, 2-D HYDRODYNAM RESPONSE TO EXCURSION	ANL	360	550
F4	RS	P	CT F	$	REXCO-H2, 2-D HYDRODYNAM RESPONSE TO EXCURSION	ANL	360	615
F4	RS	P	CT G	$	EMERALD, PWR PLANT RADIATION RELEASE & DOSE	PGE	360	546
F4	RS	P	CT I	$	BEHAVE2, OXIDE FUEL PERFORMANCE FINITE-ELEMENT	GESV	635	568

F4	RS	P	CT	I	$	PSA2, STRESS ANALYSIS MULTIANCHOR PIPE SYSTEM	AI	360	542
F4	RS	P	CT	I	$	SAP4, STRUCTURAL ANALYSIS OF LINEAR SYSTEMS	ANL	360B	641
F4	RS	P	CT	M	$	ETOE, ENDF/B TO MC**2 DATA CONVERSION	ANL	360	350
F4	RS	P	CT	W	$	MACS LATTICE VIBRATION NEUTRON SCATTRING CODES	ANC	360	574
F4	RS	P	CT	W	$	MSCAT, SLOW NEUTRON MULTIPLE SCATTERING CALC	ANL	360	575
F4	RS	P	X	A	$	COHBE, COHERENT INELASTIC SCATTERING LAW CALC	GGA	1108	385
F4	RS	P	X	A	$	LEGCOEF3, LEGENDRE COEF CALC FOR ANGULAR DIST	GGA	7044	217
F4	RS	P	X	G	$	BURST1, HYDRODYNAMIC ANALYSIS DURING BLOWDOWN	PPCO	360	435
F4	RS	P	X	G	$	MIRAB,MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL	BCL	6400	499
F4	RS	P	X	I	$	FINEL, FINITE-ELEMENT STUDY 2,3-D STRUCTURES	KAPL	6600	404
F4	RS	P	X	T	B $	ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR 1DX	HEDL	1108B	388
F4	RS	P	X	T	B $	GAF,GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC	GGA	1108	316
F4	RS	P	X	T	B $	1DX, 1-D DIFFUSION FAST X-SECTION GENERATION	BNW	1108	374
F4	RS	P	X	T	C $	VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ RTH	WANL	7094	264
F4	RS	P	X	T	E $	MOD5, STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN	NPGS	360	491
F4	RS	P	X	T	F $	CEXE,INCEXE, 1-GP 3-D XYZ XENON OSCILLATION	CEND	360	415
F4	RS	P	X	T	F $	FORE2, FAST REACTOR EXCURSION CALCULATIONS	ANL	360	174
F4	RS	P	X	T	F $	FORE2, FAST REACTOR EXCURSION CALCULATIONS	NEC	635	174
F4	RS	P	X	T	G $	MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC	BCL	6400	508
F4	RS	P	X	T	H $	ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION	ORNL	360	525
F4	RS	P	X	T	L $	GAND, GAFGAR X-SECTION LIBRARY PREPARATION	GGA	1108	345
F4	RS	P	X	T	P $	DE/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS	SLA	360	640
F4	RS	P	X	T	P $	DE/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS	SLA	6600	640
F4	RS	P	X	T	P $	FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....	ANL	360	610
F4	RS	P	X	T	P $	FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....	ANL	6600	610
F4	RS	P	XCT	A	$	FLANGE2(71-1), ENDF/B THERMAL SCATTERING DATA	DP	360B	368
F4	RS	P	XCT	C	$	GAPER1D, 1-D TRANSPORT PERTURBATION THEORY	GGA	1108	606
F4	RS	P	XCT	D	$	CONCEPT3, POWER PLANT CONCEPTUAL COST ESTIMATE	ORNL	360C	498
F4	RS	P	XCT	F	$	TASK, 1-D MULTIGROUP REACTOR KINETICS PROGRAM	ORNL	360	558
F4	RS	P	XCT	F	$	VENUS, 2-D LMFBR POWER EXCURSION DISASSEMBLY	ANL	360	511
F4	RS	PL	T	B	$	ETOG1, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT	WAPD	6600	437
F4	RS	PL	T	B	$	GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV	BNW	1107	185
F4	RS	PL	T	B	$	TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS	BHSC	360	50
F4	RS	PL	T	C	$	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC	NEC	635	287
F4	RS	PL	CT	B	$	INCITE, THERMAL SPECTRA & MULTI-GP CONSTANTS	ANC	360	565
F4	RS	PL	CT	C	$	AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	OSUC	370	29
F4	RS	PL	CT	F	$	OX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE	ANL	360	474
F4	RS	PL	CT	M	$	EDITOR, ENDF/B TAPE PROCESSING AND EDITING	ORNL	360B	502
F4	RS	PL	CT	M	$	ERREST, LOCA RCD BUNDLE CHF DATA ANALYSIS	ANC	360	518
F4	RS	PLX	T	B	$	AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES	AI	360	147
F4	RS	PLX	T	B	$	GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV	BC	625	185
F4	RS	PLX	T	B	$	GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV	UVA	6400	185
F4	RS	PLX	T	B	$	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA	GGA	1108	298
F4	RS	PLX	T	B	$	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	BNW	1108	467
F4	RS	PLX	T	B	$	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	TVA	360	467
F4	RS	PLX	T	B	$	XSDRN, DISCRETE ORDINATE MULTIGROUP CONSTANTS	ORNL	360	393
F4	RS	PLX	T	C	$	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	PURD	6500	262
F4	RS	PLX	T	C	$	VIM1, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS	AI	7600	510
F4	RS	PLXCT	B	$	FORM, FAST NEUTRON SPECTRUM X-SECTION CALC	OSUC	370	51
F4	RS	PLXCT	B	$	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	WAPD	360	279
F4	RS	PLXCT	B	$	PHROG, MULTI-GP CONSTANT & FAST SPECTRA CALC	ANC	360	520
F4	RSB	XCT	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	360	534
F4	RSB	L	T	M	$	CLIP, FORM OR THREDES LIBRARY UTILITY ROUTINE	AI	360	271
F4	RSBP			A	$	MUFFLE, FISSILE NUCLIDE X-SECTION EVALUATION	ORNL	7090	323
F4	RSBP			D	$	CHAINS, ANALYSIS OF RADIOACTIVE DECAY CHAINS	GEC	635	418
F4	RSBP			D	$	DOS, NEUTRON FLUX-DOSIMETER ACTIVITY RELATION	GEC	635	423
F4	RSBP			O	$	MICHRD, MICROHARDNESS MEASUREMENT ANALYSIS	GEC	635	421
F4	RSBP			P	$	GRAPH, LINEAR REGRESSION W/CONFIDENCE LIMITS	BKC	360	624
F4	RSBP			P	$	HISTOGRAMS, QUALITY CONTROL SAMPLE STATISTICS	BKC	360	614
F4	RSBP		T	B	$	GROUSE, SPACE-DEPENDENT X-SECTION GENERATION	GEC	635	420
F4	RSBP		T	D	$	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	ANL	3600	325
F4	RSBP		T	K	$	THREDES, 1-D FEW-GP DIFFUSION DESIGN SYSTEM	AI	360	273
F4	RSBP		C	P	$	LATIN SQ, NXN LATIN SQUARE EXPERIMENTAL DESIGN	MLMO	360	630
F4	RSBP		CT	C	$	ARC-DIF1D, 1-D MULTI-GP DIFFUSION & INVENTORY	ANL	360	626

F4	RSBP CT C $	HERESY3, 2-D HETEROGENEOUS REACTOR CALCULATION	DP	360B	136
F4	RSBP CT C $	MONA, 1-D MULTIGROUP DIFFUSION SLAB, CYL, SPH	ANC	360	582
F4	RSBP CT C $	TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM	LASL	360	608
F4	RSBP CT C $	TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA	LASL	360D	358
F4	RSBP CT D $	DWARF, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM	ANC	360	579
F4	RSBP CT G $	FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION	MA-G	360	448
F4	RSBP CT G $	PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES	ANC	360	528
F4	RSBP CT G $	RSAC, RADIOLOGICAL SAFETY ANALYSIS PROGRAM	ANC	360	265
F4	RSBP CT I $	FPFM, STEADY-STATE FISSION PRODUCT FUEL MODEL	ANC	360	584
F4	RSBP CT I $	SAFE-PORS, STRESS ANALYSIS AXISYMMETRIC LOAD	GGA	7044	250
F4	RSBP CT I $	STRAP, STATIC & DYNAMIC STRUCTURAL ANALYSIS	ANC	360	539
F4	RSBP CT J $	VIEWPIN, VIEW FACTOR CALC FOR CYLINDRICAL PINS	ANC	360	569
F4	RSBP CT L $	ARC-NUIOO2, BCD INPUT DATA PROCESSING MODULE	ANL	360	533
F4	RSBP CT Q $	ISOTAB, PU POWER OUTPUT FROM MIXED ISOTOPES	MLMO	360	619
F4	RSBP X T D $	SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION	AI	360	58
F4	RSBP X T G $	THETA1-B, FUEL ROD THERMAL RESPONSE LOCA	ANC	360	512
F4	RSBP XCT B $	XLACS, XSDRN MULTIGROUP LIBRARIES FROM ENDF/B	ORNL	360	572
F4	RSBP XCT G $	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	360	369
F4	RSBP XCT H $	MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC	ANC	360	551
F4	RSBP XCT W $	GAUSS5, ANALYSIS OF GAMMA-RAY SPECTRA GE(LI)	ANC	360	605
F4	RSBPL CT C $	RAFFLE-ANC, MONTE CARLO NEUTRON TRANSPORT CODE	ANC	360	631
F4	RSBPL CT C $	VARI-1D, 1-D VARIATIONAL SENSITIVITY	ANL	360	625
F4	RSBPL CT C $	VIM1X, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS	AI-A	360	510
F4	RSBPL CT L $	ARC-XSEC1, MICROSCOPIC X-SECTION MANIPULATION	ANL	360	594
F4	RSBPLX T C $	ANISN, 1-D MULTI-GP DISCRETE ORDINATE CALC	AI	360	151
F4	RSBPLX T C $	CAESAR4,LIBLST, 1-D MULTI-GP DIFFUSION + LIB	AI	360	270
F4	RSBPLX T D $	NAP, NEUTRON-INDUCED GAMMA-RAY RADIOACTIVITY	IITR	7094	314
F4	RSBPLXCT B $	LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE	TVA	360	249
F4	RSBPLXCT C $	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	MTS	360	262
F5	RS LX T B $	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	JNC	1108	279
F5	RS P A $	FLANGE1, SCATTERING LAW X-SECTION CALCULATION	GGA	1108	247
F5	RS P H $	FLAC, STEADY-STATE FLOW, PRESSURE DISTRIBUTION	GGA	1108	395
F5	RS P T B $	ENDFB2,GAND2,GFE2, ENDF/B TO GAFGAR X-SECTIONS	GGA	1108	596
F5	RS P T C $	2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE	GGA	1108	173
F5	RS P T D $	DRUFIT1, LEAST SQUARES TRANSMUTATION ANALYSIS	BNW	1108	456
F5	RS P T H $	REPP, THERMAL-HYDRAULIC WATER REACTOR DESIGN	BNW	1108	483
F5	RS P T H $	TAC2D, STEADY-STATE AND TRANSIENT TEMP CALC	GGA	1108	408
F5	RS P T H $	TAC3D, TRANSIENT 3-D HEAT TRANSFER PROGRAM	GGA	1108	414
F5	RS P T I $	SAFE-CRACK, VISCOELASTIC ANALYSIS OF CONCRETE	GGA	1108	451
F5	RS P T I $	SHELL5, THIN SHELL 3-D STRUCTURAL ANALYSIS	GGA	1108	452
F5	RS P T M $	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE	NEC	1108	493
F5	RS P T N $	GAPER2D, 2-D PERTURBATION CALC FROM 2DF OUTPUT	GGA	1108	471
F5	RS P T O $	CAGE,BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS	GEES	1108	476
F5	RS P T R $	TOPLYR2, POWER PLANT THERMAL DISCHARGE STUDY	HECL	1108	599
F5	RS P CT A $	FSDP3, POINTWISE XSECS. FROM B-W PARAMETERS	GGA	1108	216
F5	RS P X T D $	PACTOLUS,CLOTHO, NUCLEAR POWER PLANT COST CODE	HECL	1108	540
F5	RS P X T F $	NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES	BNW	1108	488
F5	RS P X T P $	FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....	ANL	1108	610
F5	RS PLX T B $	BRT1, THERMAL SPECTRUM X-SECTION CALC	BNW	1108	184
F5	RSBPL T D $	ISOGEN, RADIONUCLIDE GENERATION AND DECAY	BNW	1108	367
F63	RS C $	PERT, 1-D PERTURBATION FOR AIM AND FOG CODES	CDC	1604	30
F63	RS C $	TDP, 2-D PERTURBATION TOC OR 2DXY FLUX INPUT	PW	1604	199
F63	RS C $	2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE	UNC	1604	173
F63	RS I $	WOPEXPRT, REACTOR WEIGHT OPTIMIZATION STUDY	PW	1604	190
F63	RS L $	CSP1, SN X-SECTION LIBRARY TAPE PREPARATION	PW	1604	194
F63	RS L $	CSP2A, SN X-SECTION LIBRARY TAPE PREPARATION	PW	1604	193
F63	RS T C $	2DXYL, 3-D MULTI-GP FLUX SYNTHESIS PROGRAM CYL	PW	1604	192
F63	RS L T D $	SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION	CDC	1604	58
F63	RS LX T B $	GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC	ANL	3600	33
F63	RS P A $	HAFEVER, HAUSER-FESHBACH INELASTIC SCATTERING	CDC	1604	14
F63	RS P A $	PEGGY, ELASTIC SCATTERING PHASE-SHIFT ANALYSIS	ORNL	1604	334
F63	RS P A $	RAMES, PARTICLE WAVE FUNCTION RADIAL INTEGRALS	ORNL	1604	335
F63	RS P B $	SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY	CDC	1604	52
F63	RS P B $	S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION	CDC	1604	53

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F63   RS P      D $ ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS        ORNL 1604     180
F63   RS P      D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC ORNL 1604     322
F63   RS P      D $ ISOTOPES, MAXIMUM YIELD FROM REACTION OR DECAY ORNL 1604     179
F63   RS P      D $ POWERCO, NUCLEAR STATION ELECTRICITY COSTS      ORNL 1604     340
F63   RS P      E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK   CDC  1604     121
F63   RS P      E $ CMPXMAT, TRANSFER FUNCTION EVALUATION           PW   1604     188
F63   RS P      F $ AX-TNT, COUPLED NEUTRONICS-HYDRODYNAMICS SPH    PW   1604     191
F63   RS P      G $ CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD         CDC  1604      47
F63   RS P      H $ MJ899,HCH, STEAM TABLES 14.5-2538 PSIA         ANL  1604     294
F63   RS P      J $ GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY    CDC  1604      45
F63   RS P      J $ GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM  CDC  1604      46
F63   RS P      L $ SNC, CALCULATION OF SN CONSTANTS FOR DSN TDC    PW   1604     189
F63   RS P    T A $ JUPITOR1, COUPLED-CHANNEL X-SEC EVALUATION     ORNL 1604     308
F63   RS P    T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB  CDC  1604      87
F63   RS P    T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE CDC  1604      28
F63   RS P    T C $ FORTRAN TDC, 2-D MULTI-GP SN APPROXIMATION RZ  PW   1604     161
F63   RS P    T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY  CDC  1604      32
F63   RS P    T C $ 20GRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER CDC  1604      40
F63   RS P    T I $ PIP, CENTRIFUGAL PUMP IMPELLER DESIGN STUDY    PW   1604     187
F63   RS PL   T A $ ARES2, RESONANCE INTEGRAL X-SECTION CALC       CDC  1604      89
F63   RS PL   T B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC     CDC  1604      51
F63   RS PL   T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS  CDC  1604      50
F63   RS PL   T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604      29
F63   RS PL   T C $ DTF, 1-D MULTIGROUP DISCRETE ORDINATE CALC     UNC  1604     144
F63   RS PLX  T B $ GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC     CDC  1604      33
F63   RS PLX  T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604     120
F63   RSBP      A $ NEARREX, COMPOUND NUCLEUS X-SECTION CALC       ANL  3600     171
F63   RSBP      E $ R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS   ANL  3600     255
F63   RSBP      E $ R102, SPACE-INDEPENDENT INVERSE KINETICS CALC  ANL  3600     168
F63   RSBP      F $ AX1, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE   CDC  3600     102
F63   RSBP      O $ COINC, COINCIDENCE COUNTING DATA REDUCTION     ANL  3600     248
F63   RSBP    T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS  ANL  3600     254
F63   RSBP    T C $ FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION   CDC  3600     167
F63   RSBP    T E $ TRAFICORPORATION, TRANSFER FUNCTION SYNTHESIS  ANL  3600     135
F63   RSBP    T G $ R153, PARAMETRIC SITE REQUIREMENT STUDY        ANL  3600     172
F63   RSBP    T H $ ARGUS, TRANSIENT TEMPERATURE CALC CYLINDER     ANL  3600     152
F63   RSBP    T M $ XLIBIT, X-SECTION LIBRARY UTILITY ROUTINE      ANL  3600     181
F63   RSBP XCT B $ THERMOS(ANL), THERMAL SPECTRUM X-SECTION CALC   ANL  3600     184
F63   RSBPL   T J $ MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY    ANL  3600     143
G-Z  ANL   360  F+P+A RS      T P $ AMDLIBGZ, ARGONNE SUBROUTINE LIBRARY CAT.  564
GADOSE,DOSET, HTGR ACCIDENT ANALYSIS DOSE CALC GGA  1108  F4     RS      T G $  261
GAF,GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC GGA  1108  F4     RS P X T B $  316
GAFFE, EQUILIBRIUM FUEL CYCLE CALCULATION      GGA  1108  F4     S       T D $  302
GAFGAR ENDF/B DATA TAPES   GGA  1108  BIN    R   L  T Z $ ZPR-III ASSEMBLY 48  356
GAFGAR X-SECTION LIBRARY PREPARATION     GGA  1108  F4     RS P X T L $ GAND,  345
GAFGAR X-SECTIONS GGA  1108  F5    RS P   T B $ ENDFB2,GAND2,GFE2, ENDF/B TO  596
GAKER, INELASTIC SCAT X-SECTION CALC MODERATOR GGA  1108  F4     RS P      A $  289
GAKIN2, 1D MULTIGROUP TIME-DEPENDENT DIFFUSION MIT   370  F4     RS P    T F $  310
GAKIT, 1-D MULTIGP KINETICS WITH TEMP FEEDBACK GGA  1108  F4     RS P    T F $  370
GAM, ANISN X-SEC FORMAT WAPD 6600  F4     RS PL  T B $ ETCG1, ENDF/B TO MUFT,  437
GAM, ANISN X-SEC FORMAT WAPD 7600  F4     RS P   T B $ ETCG3, ENDF/B TO MUFT,  538
GAMBLE4, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  7044  F+MAP RSBP    T C $  222
GAMBLE5, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  1108  F+BAL RS P    T C $  222
GAMB1T, X-SEC GENERATION FOR TRANSPORT CODES   WANL 6600  F4     RS  L   T B $  547
GAMMA DOSE INTEGRALS     DP     360  F4     RS P      G $ EGAD, CALC OF EXTERNAL  600
GAMMA RAY CATALOG     DP     3608 EBCDC R   L  T Z $ GAMTAB, RADIOACTIVE-DECAY  637
GAMMA RAY SOURCE BUILDUP FACTOR CALC     BAPL 6600  F+ASC RS P    T J $ ASPIS,  429
GAMMA RAY SPECTRA        ORNL  360  F4     RS P      O $ ALPHA-M, RESOLUTION OF  413
GAMMA-P, PRODUCTION X-SECTIONS FOR GAMMA-RAYS  GEC  7094  F4     RS P      B $  235
GAMMA-RAY ATTENUATION CYL SPHERE GEOM  AI   7090  F2     RS P      J $ GRACE2,  46
GAMMA-RAY ATTENUATION CYL SPHERE GEOM  CDC  1604  F63    RS P      J $ GRACE2,  46
GAMMA-RAY ATTENUATION SLAB GEOMETRY    AI   7090  F2     RS P      J $ GRACE1,  45
GAMMA-RAY ATTENUATION SLAB GEOMETRY    CDC  1604  F63    RS P      J $ GRACE1,  45
GAMMA-RAY DOSE RATE FROM A CLOUD       AI   7090  F2     RS P      G $ CLOUD,   47
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GAMMA-RAY DOSE RATE FROM A CLOUD          CDC  1604  F63    RS P      G $ CLOUD,      47
GAMMA-RAY DOSE RATE FROM A CLOUD          DP    360  F4     RS P      G $ CLOUD,      47
GAMMA-RAY HISTORIES   PW   1604  F+CDP RS P X T B $ FMC-N,FMC-G, MC NEUTRON,        195
GAMMA-RAY PHOTOFRACTION SOLID CRYSTAL     MTS  7090  MAD    RSB       O $ BURP4,     169
GAMMA-RAY PHOTOFRACTION WELL CRYSTAL      MTS  7090  MAD    RSB       O $ BURP5,     170
GAMMA-RAY RADIOACTIVITY   IITR 7094  F4     RSBPLX T D $ NAP, NEUTRON-INDUCED        314
GAMMA-RAY SPECTRA     ANC   360  F+P+A RSBP XCT W $ GAUSS6, BATCH ANALYSIS OF        622
GAMMA-RAY SPECTRA ANALYSIS      KAPL 6600  F4     RS      T O $ GASPAN, COMPLEX       485
GAMMA-RAY SPECTRA GE(LI)   ANC   360  F4     RSBP XCT W $ GAUSS5, ANALYSIS OF        605
GAMMA-RAY SPECTRA GGA  1108  F+BAL RS P    T O $ TOAD, PROCESSING OF ANALYZER        333
GAMMA-RAY SPECTRA KSUN  360  F4     RS P      O $ CORGAM, UNFOLDING OF COMPLEX        390
GAMMA-RAY TRANSPORT        BAPL 6600  F4     RS P    T J $ MC756,LETC, 1-D SLAB        343
GAMMA-RAYS  GEC  7094  F4     RS P      B $ GAMMA-P, PRODUCTION X-SECTIONS FOR      235
GAMTAB, RADIOACTIVE-DECAY GAMMA RAY CATALOG     DP    360B EBCDC R    L   T Z $       637
GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV     BC    625  F4     RS PLX T B $        185
GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV     BNW  1107  F4     RS PL   T B $       185
GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV     BNW  7090  F+FAP RS PL   T B $        185
GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV     UVA  6400  F4     RS PLX T B $        185
GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR MESH   GGA  1108  F+BAL RS P    T C $       401
GAM1 OR 2     WAPD 6600  BCD    R    L   T Z $ ETOG1 DATA LIBRARIES, MUFT4 OR 5,      447
GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC      ANL  3600  F63    RS  LX T B $        33
GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC      CDC  1604  F63    RS PLX T B $        33
GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC      GGA  7090  F2     RS PLX T B $        33
GAND, GAFGAR X-SECTION LIBRARY PREPARATION      GGA  1108  F4     RS P X T L $        345
GANDY3, UNRESOLVED RESONANCE X-SECTION CALC     GGA  1108B F4     RS P    T A $       341
GAND2,GFE2, ENDF/B TO GAFGAR X-SECTIONS GGA  1108  F5     RS P    T B $ ENDFB2,       596
GAP CONDUCTANCE CALC BNW  1108  F4     RS P    T H $ GAPCON-THERMAL1, FUEL PIN       618
GAPCON-THERMAL1, FUEL PIN GAP CONDUCTANCE CALC  BNW  1108  F4     RS P    T H $       618
GAPER1D, 1-D TRANSPORT PERTURBATION THEORY      GGA  1108  F4     RS P  XCT C $       606
GAPER2D, 2-D PERTURBATION CALC FROM 2DF OUTPUT  GGA  1108  F5     RS P    T N $       471
GAPL3, INELASTIC LARGE DEFLECTION STRESS STUDY  BAPL 6600  F+CCM RS P    T I $       397
GAPOTKIN, SPACE-INDEPENDENT REACTOR KINETICS    GGA  1108  F4     RS P      E $       317
GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC GGA  1108  F4     RS P X T B $ GAF,         316
GARGOYLE, FUEL CYCLE ANALYSIS PARTIAL REFUEL    GGA  7044  F4     RS P    T D $       260
GARCL, RESONANCE OVERLAP AND LATTICE EFFECTS    GGA  7044  F+MAP RS P    T B $       219
GARCL, RESONANCE OVERLAP AND LATTICE EFFECTS    LER  7094  F+MAP RS P    T B $       219
GAS RELEASE SIMULATION   BAPL 6600  F4     RS P    T I $ BUBL1, FUEL SWELLING &      468
GAS-COOLED CORE THERMAL DESIGN STUDY GGA  7044  F4     RS P      I $ GAZELLE5,       232
GASA, STABILITY ANALYSIS REACTOR KINETICS EQNS  GGA  1108  F4     RS P      E $       290
GASECUS RELEASE  ORNL  360  F4     RS P  C  G $ STEFEG, ANALYSIS OF PWR & BWR        583
GASES BY MASS SPECTROMETRY RED   360  F4     RS P      U $ DYNAMIC ANALYSIS OF       645
GASKET, THERMAL SCATTERING LAW CALCULATION      GGA  1108  F4     RS P      A $       263
GASPAN, COMPLEX GAMMA-RAY SPECTRA ANALYSIS      KAPL 6600  F4     RS      T O $       485
GASP2, 1-D FEW-GP DIFFUSION POWER DIST SEARCH   GGA  7044  F4     RS P    T C $       220
GASP7, 1-D BURNUP POWER DISTRIBUTION SEARCH     GGA  1108  F4     RS P    T C $       319
GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z MESH      GGA  1108  F4     RS P    T C $       380
GAUGE, 2-D FEW-GP HEX GEOM DIFFUSION DEPLETION  GGA  1108  F4     RS P    T D $       339
GAUSS5, ANALYSIS OF GAMMA-RAY SPECTRA GE(LI)    ANC   360  F4     RSBP XCT W $        605
GAUSS6, BATCH ANALYSIS OF GAMMA-RAY SPECTRA     ANC   360  F+P+A RSBP XCT W $         622
GAVER, ENERGY INTERVAL X-SECTION AVERAGING      GGA  7044  F4     RS P      L $       218
GAZELLE5, GAS-COOLED CORE THERMAL DESIGN STUDY  GGA  7044  F4     RS P      I $       232
GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL  GGA  1108  F+BAL RS P    T C $       430
GE(LI)   ANC   360  F4     RSBP XCT W $ GAUSS5, ANALYSIS OF GAMMA-RAY SPECTRA        605
GE-HAPO-S13, 1-D MULTI-GP DOUBLE SN APPROX      BNW  7090  FLCCC RSBP    T C $        75
GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER   ANL  3608  F4     RS P  C  P $        592
GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER   LLL  6600B F4     RS P      P $       592
GEC   625  F4     RS P      B $ AVOID, ANNULAR VOID X-SECTION CALCULATION             276
GEC   635  F+FAP RSBP    T O $ CASCADE,CLUSTER, RADIATION DAMAGE IN METALS           419
GEC   635  F+GMP RSBP    T H $ THTE, 3-D TRANSIENT HEAT TRANSFER PROGRAM             346
GEC   635  F4     RSBP      D $ CHAINS, ANALYSIS OF RADIOACTIVE DECAY CHAINS          418
GEC   635  F4     RSBP      D $ DOS, NEUTRON FLUX-DOSIMETER ACTIVITY RELATION         423
GEC   635  F4     RSBP      O $ MICHRD, MICROHARDNESS MEASUREMENT ANALYSIS            421
GEC   635  F4     RSBP    T B $ GROUSE, SPACE-DEPENDENT X-SECTION GENERATION          420
GEC  7090  FAP    RSBP X T C $ SPECTRA, MC CALCULATION IRRADIATED MATERIAL             422
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GEC  7094  F4     RS P      B $ GAMMA-P, PRODUCTION X-SECTIONS FOR GAMMA-RAYS      235
GEES 1108  F5     RS P    T D $ CAGE,BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS       476
GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS  UICS  360  F4     RS P  CT D $      576
GEM, EIGENVALUE PROBLEM FOR VIBRATING SYSTEMS  KAPL 6600  F+ASC RS P    T I $    344
GENED ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.  NED   635  F+GMP RS      T P $    515
GENERATOR DESIGN CRITERIA COSTS  GGA  7044  F4     RS P    T D $ STMGEN, STEAM    227
GENERATOR SODIUM-WATER REACTION   CEND 7600  F4     RS P    T G $ CEBUG, STEAM     548
GENRD, FREE-FORMAT CARD INPUT PROCESSOR          LASL  360  F4     RS P      L $  530
GENRD, FREE-FORMAT CARD INPUT PROCESSOR          LASL 6600  F4     RS P      L $  530
GEOMETRICAL DATA HEAT TRANSFER STUDY SLL  6600  F4     RS P      N $ HEATMESH,    434
GEPI GETS  BASIC R         M $ MAPPER, PREDICTING MANUFACTURING REQUIREMENTS      595
GESV  635  F+GMP RS P XCT B $ ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B DATA      501
GESV  635  F+GMP RS P XCT L $ TDOWN, SPATIAL & COMPOSITION-DEPENDENT X-SECS       505
GESV  635  F4     RS P  CT I $ BEHAVE2, OXIDE FUEL PERFORMANCE FINITE-ELEMENT     568
GESV H600  F4     RS P  CT C $ TRIAL, 3-D REACTION RATES FROM 2-D FLUX SETS       585
GETCOR,FRECOR, FORTRAN DYNAMIC STORAGE ALLOC   CRNL  360  BAL+F RS P  CT P $      644
GETS  BASIC R         M $ MAPPER, PREDICTING MANUFACTURING REQUIREMENTS  GEPI    595
GETS  F     R         R $ PLETHS, ISOPLETH-AREA CALC FROM SINGLE SOURCE  ANL     591
GFE2, ENDF/B TO GAFGAR X-SECTIONS GGA  1108  F5     RS P    T B $ ENDFB2,GAND2,    596
GGA  1108  BIN    R    L  T Z $ ZPR-III ASSEMBLY 48 GAFGAR ENDF/B DATA TAPES       356
GGA  1108  F+BAL RS P    T C $ GAMBLE5, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY    222
GGA  1108  F+BAL RS P    T C $ GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR MESH     401
GGA  1108  F+BAL RS P    T C $ GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL    430
GGA  1108  F+BAL RS P    T D $ BUGTRI, 2-D MULTIGP DIFFUSION+BURNUP TRI-MESH     439
GGA  1108  F+BAL RS P    T D $ BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP XY, RZ    438
GGA  1108  F+BAL RS P    T E $ BLOOST6, COMBINED KINETICS 2-D HEAT TRANSFER      303
GGA  1108  F+BAL RS P    T O $ TOAD, PROCESSING OF ANALYZER GAMMA-RAY SPECTRA    333
GGA  1108  F4     S      T D $ GAFFE, EQUILIBRIUM FUEL CYCLE CALCULATION         302
GGA  1108  F4     RS        B $ HEXSCAT, ELASTIC SCAT X-SECTIONS HEX LATTICE     291
GGA  1108  F4     RS      T G $ GADOSE,DOSET, HTGR ACCIDENT ANALYSIS DOSE CALC   261
GGA  1108  F4     RS P      A $ GAKER, INELASTIC SCAT X-SECTION CALC MODERATOR   289
GGA  1108  F4     RS P      A $ GASKET, THERMAL SCATTERING LAW CALCULATION       263
GGA  1108  F4     RS P      A $ PSEUDO, STATISTICAL RESONANCE PARAMETER CALC     292
GGA  1108  F4     RS P      D $ FREVAP6, HTGR METALLIC FISSION PRODUCT RELEASE   301
GGA  1108  F4     RS P      E $ GAPOTKIN, SPACE-INDEPENDENT REACTOR KINETICS     317
GGA  1108  F4     RS P      E $ GASA, STABILITY ANALYSIS REACTOR KINETICS EQNS   290
GGA  1108  F4     RS P      I $ SAFE-CREEP, VISCOELASTIC ANALYSIS CONCRETE       300
GGA  1108  F4     RS P      I $ SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES    252
GGA  1108  F4     RS P      I $ SAFE-SHELL, STRESS ANALYSIS THIN SHELLS          253
GGA  1108  F4     RS P      I $ SAFE-2D, PLANE & AXISYMMETRIC STRESS ANALYSIS    379
GGA  1108  F4     RS P      L $ GRDWRK, GRID GENERATION FOR SAFE PROGRAMS        296
GGA  1108  F4     RS P    T A $ TACASI, ANALYSIS OF RESONANCE MEASUREMENTS       410
GGA  1108  F4     RS P    T C $ GASP7, 1-D BURNUP POWER DISTRIBUTION SEARCH      319
GGA  1108  F4     RS P    T C $ GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z MESH       380
GGA  1108  F4     RS P    T C $ TEMCO7, TEMPERATURE COEFFICIENT CALCULATION      320
GGA  1108  F4     RS P    T D $ FEVER7, 1-D MULTIGROUP DIFFUSION AND DEPLETION   318
GGA  1108  F4     RS P    T D $ GAUGE, 2-D FEW-GP HEX GEOM DIFFUSION DEPLETION   339
GGA  1108  F4     RS P    T D $ PWCOST, REACTOR FUEL CYCLE COST CALCULATION      441
GGA  1108  F4     RS P    T F $ GAKIT, 1-D MULTIGP KINETICS WITH TEMP FEEDBACK   370
GGA  1108  F4     RS P    T F $ WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM      274
GGA  1108  F4     RS P    T H $ DYNAM, DYNAMIC ANALYSIS BOILING FLOW STEAM       440
GGA  1108  F4     RS P    T I $ SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY    332
GGA  1108  F4     RS P    T J $ MUSCAT, VIEW FACTOR SHIELDING CODE CAVITY GEOM   259
GGA  1108  F4     RS P X    A $ COHBE, COHERENT INELASTIC SCATTERING LAW CALC    385
GGA  1108  F4     RS P X T B $ GAF,GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC    316
GGA  1108  F4     RS P X T L $ GAND, GAFGAR X-SECTION LIBRARY PREPARATION        345
GGA  1108  F4     RS P XCT C $ GAPER1D, 1-D TRANSPORT PERTURBATION THEORY        606
GGA  1108  F4     RS PLX T B $ GOC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA    298
GGA  1108  F5     RS P      A $ FLANGE1, SCATTERING LAW X-SECTION CALCULATION    247
GGA  1108  F5     RS P      H $ FLAC, STEADY-STATE FLOW, PRESSURE DISTRIBUTION   395
GGA  1108  F5     RS P    T B $ ENDFB2,GAND2,GFE2, ENDF/B TO GAFGAR X-SECTIONS   596
GGA  1108  F5     RS P    T C $ 2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE         173
GGA  1108  F5     RS P    T H $ TAC2D, STEADY-STATE AND TRANSIENT TEMP CALC      408
GGA  1108  F5     RS P    T H $ TAC3D, TRANSIENT 3-D HEAT TRANSFER PROGRAM       414
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GGA  1108  F5     RS P    T I $ SAFE-CRACK, VISCCELASTIC ANALYSIS CF CCNCRETE      451
GGA  1108  F5     RS P    T I $ SHELL5, THIN SHELL 3-D STRLCTURAL ANALYSIS         452
GGA  1108  F5     RS P    T N $ GAPER2D, 2-D PERTURBATION CALC FRCM 2DF OUTPUT     471
GGA  1108  F5     RS P   CT A $ FSDP3, POINTWISE XSECS. FRCM B-W PARAMETERS        216
GGA  1108B F4     RS P    T A $ GANDY3, UNRESOLVED RESCNANCE X-SECTION CALC        341
GGA  66CC  F4     RS  L   T B $ GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA      298
GGA  7044  F+MAP  RS P    T B $ GARCL, RESONANCE CVERLAP AND LATTICE EFFECTS       219
GGA  7044  F+MAP  RS P    T D $ OPUS, POWER PLANT PERFORMANCE AND PRICE STUDY      226
GGA  7044  F+MAP  RS P    T H $ BLOOST5, PCINT-KINETICS WITH 2-D HEAT TRANSFER     205
GGA  7044  F+MAP  RSBP      M $ UNPACK, RETRIEVAL FRCM SCISRS X-SECTION TAPE       206
GGA  7044  F+MAP  RSBP    T C $ GAMBLE4, 2-D MULTI-GP DIFFLSION XY RZ GECMETRY     222
GGA  7044  F+SPS  RSBP    T N $ CROSSPLOT, SC4020 PLCTS FRCM X-SECTION TAPES       207
GGA  7044  F4     RS        I $ CORE, CORE CCNFIGURATION FLEL TEMPERATLRE CCDE       233
GGA  7044  F4     RS    X T G $ PRECON, HTGR CCNTAINMENT PRESSURE PCST RUPTURE     228
GGA  7044  F4     RS P      D $ RAD2, HTGR FISSION PRODUCT ACTIVITY DIST STUDY       231
GGA  7044  F4     RS P      D $ WAMPUM, FUEL CYCLE CCSTS PERFORMANCE STUDY           224
GGA  7044  F4     RS P      I $ GAZELLE5, GAS-CCCLED CCRE THERMAL CESICN STUDY       232
GGA  7044  F4     RS P      L $ GAVER, ENERGY INTERVAL X-SECTION AVERAGING           218
GGA  7044  F4     RS P    T B $ FMC-N, MONTE CARLC CALC NELTRCN HISTCRIES            195
GGA  7044  F4     RS P    T C $ GASP2, 1-D FEW-GP DIFFUSICN POWER DIST SEARCH        220
GGA  7044  F4     RS P    T C $ TEMCO, 1-D FEW-GP DIFFLSICN TEMP CCEF CALC           225
GGA  7044  F4     RS P    T D $ GARGOYLE, FUEL CYCLE ANALYSIS PARTIAL REFUEL         260
GGA  7044  F4     RS P    T D $ RELCAD-FEVER, 1-D FEW-GP DIFFLSICN DEPLETICN         221
GGA  7044  F4     RS P    T D $ REVISED-GAD, FUEL CYCLE ANALYSIS W/REFUELING         223
GGA  7044  F4     RS P    T D $ STMGEN, STEAM GENERATCR DESICN CRITERIA CCSTS        227
GGA  7044  F4     RS P    T G $ ELBCW, FUEL FLEMENT STRESS ANALYSIS STLDY            229
GGA  7044  F4     RS P    T I $ SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC LCAD       251
GGA  7044  F4     RS P X    A $ LEGCOEF3, LEGENDRE COEF CALC FCR ANGULAR DIST        217
GGA  7044  F4     RSBP   CT I $ SAFE-PCRS, STRESS ANALYSIS AXISYMMETRIC LCAD         250
GGA  7090  F+FAP  RSB     T A $ TUZ, UNRESOLVED REGION RESCNANCE INTEGRAL CALC       42
GGA  7090  F+FAP  RSB     T A $ ZUT, RESOLVED REGION RESONANCE INTEGRAL CALC         41
GGA  7090  F+FAP  RSBP    T C $ DCB, 2-D FEW-GP DIFFUSION BURNUP RZ GECMETRY         99
GGA  7090  F2     RS      T A $ SUMMIT, CRYSTALLINE SCATTERING KERNEL CALC           56
GGA  7090  F2     RS PLX  T B $ GAM1, FAST NEUTRCN SPECTRUM X-SECTICN CALC           33
GGA  7090  F2     RSB     T D $ FEVER, 1-D FEW-GP DIFFLSICN CEPLETICN PROGRAM       117
GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA GGA  1108  F4     RS PLX T B $      298
GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA GGA  6600  F4     RS  L  T B $      298
GLEN, GRCUP CONSTANT CALC FROM TOR OUTPUT DATA LASL 6600  F4     RS P   T B $      361
GLUB1, WATER-LOGGED FUEL ELEMENT ANALYSIS      BAPL 6600  F4     RS P   T H $      424
GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY    AI   7090  F2     RS P     J $       45
GRACE1, GAMMA-RAY ATTENUATICN SLAB GEOMETRY    CDC  1604  F63    RS P     J $       45
GRACE2, GAMMA-RAY ATTENUATICN CYL SPHERE GECM  AI   7090  F2     RS P     J $       46
GRACE2, GAMMA-RAY ATTENUATICN CYL SPHERE GECM  CDC  1604  F63    RS P     J $       46
GRAMP, R-M PARAMETERS OF UNRESOLVED RESONANCES BAPL 6600  F4     RS P     A $      470
GRAPH, LINEAR REGRESSION W/CCNFIDENCE LIMITS   BKC   360  F4     RSBP     P $      624
GRAPHIC X-SEC EVALUATION AI     360  F+BAL RSB L CT M $ SCCRE3, SCISRS ENDF/B      375
GRAPHICS SUBRCUTINES AI     360  F+BAL RS      T P $ FIGS, IBM360&2250 FORTRAN     484
GRAVE, GROUP-AVERAGING X-SECTIONS PARAMETERS   AI   7094  F+FAP RS PL  T B $       162
GRDWRK, GRID GENERATION FOR SAFE PRCGRAMS      GGA  1108  F4     RS P     L $       296
GRID GENERATICN FOR SAFE PRCGRAMS      GGA  1108  F4     RS P     L $ GRDWRK,       296
GROUP COLLAPSING  APRF 6600  F4     RS        B $ APRFX1, 99-GP DLC-2B LIBRARY     466
GROUP CONSTANT CALC FROM TOR OUTPUT DATA LASL 6600  F4     RS P   T B $ GLEN,        361
GROUP OR MESH COLLAPSING       TRW  6500  F4     RS P     B $ PARTI, OPTIMAL        416
GROUP THEORY OF LATTICE DYNAMICS       ANL   360  F4     RS P   T Q $ GROUP2,      620
GROUP THEORY OF LATTICE DYNAMICS       LASL 6600  F4     RS P   T Q $ GROUP2,      620
GROUP-AVERAGED X-SEC CALC GGA  1108  F4     RS P X T B $ GAF,GAR, SPECTRA AND      316
GROUP-AVERAGING X-SECTIONS PARAMETERS  AI   7094  F+FAP RS PL  T B $ GRAVE,        162
GROUP-COLLAPSING OF MULTI-GP X-SECTIONS   LASL 7090  FLCCC RS P     B $ ZOT,        113
GROUP2, GROUP THEORY OF LATTICE DYNAMICS       ANL   360  F4     RS P   T Q $      620
GROUP2, GROUP THEORY OF LATTICE DYNAMICS       LASL 6600  F4     RS P   T Q $      620
GROUSE, SPACE-DEPENDENT X-SECTICN GENERATICN   GEC   635  F4     RSBP   T B $      420
GSSLRN1B, LEAST SQUARES PHOTOPEAK SPECTRA CODE BNW  1108  F+BAL RS P   T C $       457
HAA3, COAGULATION OF HETERCGENECUS AEROSOLS    AI    360  F4     RS P   T G $      443
HAFEVER, HAUSER-FESHBACH INELASTIC SCATTERING  CDC  1604  F63    RS P     A $       14
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HAFMAT, SYSTEM STEADY-STATE FLOW DISTRIBUTICN KAPL 6600 F4 RS P T H $ 616
HAMMER,LITHE,HELP, CRITICAL ANALYSIS SYSTEM DP 360 F+BAL RS P XCT B $ 277
HARMONY-PDQ X-SECTION GENERATION CODE BAPL 6600 F+CCM RS P X T B $ PAX03, 426
HATCHET, COUPLED NEUTRONICS-HYDRODYNAMICS CODE ACC 7090 F2 RSB F $ 153
HAUSER-FESHBACH INELASTIC SCATTERING CDC 1604 F63 RS P A $ HAFEVER, 14
HEAT CONDUCTION PPCO 7044 F+MAP RS P T H $ TCODEE, 2-D TIME-DEPENDENT 349
HEAT CONDUCTION ORNL 360 F4 RS P X T H $ ORTHIS,ORTHAT, 2-DIMENSIONAL 525
HEAT CONDUCTION LUMPED MASS LASL 7030 F4 RS T H $ RATH, 2- OR 3-D 242
HEAT CONDUCTION LUMPED MASS LASL 7094 FAP RS P T H $ RATH, 2- OR 3-D 242
HEAT CONDUCTION PROGRAM BAPL 6600 F4 RS P T H $ HCT2, 2-D TRANSIENT 286
HEAT CONDUCTION PROGRAM ORNL 360 F4 RS P T H $ HEATING3, 1,2, OR 3-D 517
HEAT EXCHANGER STRESS ANALYSIS KAPL 6600 F4 RS P I $ TUBE, U-TUBE 378
HEAT TRANSFER GGA 1108 F+BAL RS P T E $ BLOOST6, COMBINED KINETICS 2-D 303
HEAT TRANSFER AI 7094 F+FAP RS P T H $ HEATING2, TRANSIENT STEADY-STATE 198
HEAT TRANSFER AI 7094 F2 RS P T G $ TRANS-FUGUE1, TRANSIENT FLOW AND 268
HEAT TRANSFER CALC ANC 360 F4 RSBP XCT H $ MOXY, BWR FUEL ELEMENT 551
HEAT TRANSFER CALC ANC 1108 F4 RS P T H $ MOXY, BWR FUEL ELEMENT 551
HEAT TRANSFER GGA 7044 F+MAP RS P T H $ BLOOST5, POINT-KINETICS WITH 2-D 205
HEAT TRANSFER MOLTEN FUEL TUBE BUNDLES LASL 7094 F2 RSBP H $ AXFLU, 182
HEAT TRANSFER PROGRAM GEC 635 F+GMP RSBP T H $ THTE, 3-D TRANSIENT 346
HEAT TRANSFER PROGRAM GGA 1108 F5 RS P T H $ TAC3D, TRANSIENT 3-D 414
HEAT TRANSFER SOLID FUEL TUBE BUNDLES LASL 7094 F2 RSBP H $ AXTHRM, 183
HEAT TRANSFER STUDY SLL 6600 F4 RS P N $ HEATMESH, GEOMETRICAL DATA 434
HEATING CLADDING-STEAM REACTION ANL 3600 F36 RSBP G $ CHEMLOC2, CORE 366
HEATING2, TRANSIENT STEADY-STATE HEAT TRANSFER AI 7094 F+FAP RS P T H $ 198
HEATING3, 1,2, OR 3-D HEAT CONDUCTION PROGRAM ORNL 360 F4 RS P T H $ 517
HEATMESH, GEOMETRICAL DATA HEAT TRANSFER STUDY SLL 6600 F4 RS P N $ 434
HEATUP CODE FOR BWR/6 ANALYSIS EI 360 F+BAL RS P CT H $ 6KILER, CORE 636
HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS NED 635 F4 RS P T U $ BURNUP, 311
HEDL 1108 F+SL RS P XCT R $ HERMES, REGIONAL RADIOLOGICAL EFFECTS ANALYSIS 527
HEDL 1108 F4 RS P G $ SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS 521
HEDL 1108 F4 RS P T D $ 3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS 567
HEDL 1108 F5 RS P T R $ TCPLYR2, POWER PLANT THERMAL DISCHARGE STUDY 599
HEDL 1108 F5 RS P X T C $ PACTOLUS,CLOTHO, NUCLEAR POWER PLANT COST CODE 540
HEDL 1108B F4 RS P X T B $ ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR 1DX 388
HELP, CRITICAL ANALYSIS SYSTEM DP 360 F+BAL RS P XCT B $ HAMMER,LITHE, 277
HERESY3, 2-D HETEROGENEOUS REACTOR CALCULATION DP 360B F4 RSBP CT C $ 136
HERMES, REGIONAL RADIOLOGICAL EFFECTS ANALYSIS HEDL 1108 F+SL RS P XCT R $ 527
HETEROGENEOUS AEROSOLS AI 360 F4 RS P T G $ HAA3, COAGULATION OF 443
HETEROGENEOUS REACTOR CALCULATION DP 360B F4 RSBP CT C $ HERESY3, 2-D 136
HEX CELL BAPL 6600 F+ASC RS P X T B $ RESQ2,RESQO,DBF1, RESONANCE INTEGRAL 285
HEX GEOM DIFFUSION DEPLETION GGA 1108 F4 RS P T D $ GAUGE, 2-D FEW-GP 339
HEX LATTICE GGA 1108 F4 RS B $ HEXSCAT, ELASTIC SCAT X-SECTIONS 291
HEX-Z MESH GGA 1108 F4 RS P T C $ GATT, 3-D FEW-GP DIFFUSION CALC 380
HEXSCAT, ELASTIC SCAT X-SECTIONS HEX LATTICE GGA 1108 F4 RS B $ 291
HFN, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE BNW 1107 F4 RS P T C $ 241
HIGH-VELOCITY FLOW STUDY STEAM-WATER MIX KAPL 6600 F4 RS P H $ RAPP, 382
HISTOGRAMS, QUALITY CONTROL SAMPLE STATISTICS BKC 360 F4 RSBP P $ 614
HISTORIES GGA 7044 F4 RS P T B $ FMC-N, MONTE CARLO CALC NEUTRON 195
HISTORIES PW 1604 F+COP RS P X T B $ FMC-N,FMC-G, MC NEUTRON, GAMMA-RAY 195
HISTORY KE 7094 F2 RSBP T H $ PTH1, BLOWDOWN PRESSURE TEMPERATURE 155
HISTORY LASL 6600 F4 RS P T D $ PHENIX, 2D DIFFUSION BURNUP REFUELING 454
HOH, STEAM TABLES 14.5-2538 PSIA ANL 1604 F63 RS P H $ MO899, 294
HOH, STEAM TABLES 14.5-2538 PSIA BAPL 6600 F4 RS P T H $ MO899, 294
HOMOGENEOUS ANL 3600 F36 RSBP A $ MISH-MASH, RESONANCE INTEGRAL CALC 214
HOT2, 2-D TRANSIENT HEAT CONDUCTION PROGRAM BAPL 6600 F4 RS P T H $ 286
HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS BNW 1108 F4 RS PLX T B $ 467
HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS TVA 360 F4 RS PLX T B $ 467
HTGR ACCIDENT ANALYSIS DOSE CALC GGA 1108 F4 RS T G $ GADOSE,DOSET, 261
HTGR CONTAINMENT PRESSURE POST RUPTURE GGA 7044 F4 RS X T G $ PRECON, 228
HTGR FISSION PRODUCT ACTIVITY DIST STUDY GGA 7044 F4 RS P D $ RAD2, 231
HTGR METALLIC FISSION PRODUCT RELEASE GGA 1108 F4 RS P C $ FREVAP6, 301
HWOCR-SAFE, 2-D MONTE CARLO CELL CALCULATION AI 360 F+BAL RS P X T B $ 307
HYDRODYNAM RESPONSE TO EXCURSION ANL 360 F4 RS P CT F $ REXCC-H, 2-D 550

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HYDRODYNAM RESPONSE TO EXCURSION ANL   360  F4    RS P  CT F $ REXCO-H2, 2-D      615
HYDRODYNAMIC ANALYSIS DURING BLOWDOWN  PPCC  360  F4    RS P X   G $ BURST1,      435
HYDRODYNAMIC MASS MATRIX GENERATION      BAPL 6600  F+CCM RS P     H $ HYMAS,     560
HYMAS, HYDRODYNAMIC MASS MATRIX GENERATION      BAPL 6600  F+COM RS P     H $    560
H600  F4    RS P  CT C $ TRIAL, 3-D REACTION RATES FROM 2-D FLUX SETS   GESV      585
IBM   360A F+BAL RS P   T D $ PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION       336
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INCEXE, 1-GP 3-D XYZ XENON OSCILLATION    CEND  360  F4    RS P X T F $ CEXE,    415
INCITE, THERMAL SPECTRA & MULTI-GP CONSTANTS   ANC   360  F4    RS PL CT B $      565
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INELASTIC SCATTERING  CDC   1604  F63   RS P     A $ HAFEVER, HAUSER-FESHBACH     14
INELASTIC SCATTERING FORM FACTORS      ORNL  360  F4    RS P   T A $ ATHENA4,     417
INELASTIC SCATTERING LAW CALC  GGA   1108  F4    RS P X   A $ COHBE, COHERENT     385
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LIBLST, 1-D MULTI-GP DIFFUSION + LIB   AI    360  F4     RSEPLX T C $ CAESAR4,     270
LIBRARIES FROM ENDF/B  ORNL  360  F4     RSBP XCT B $ XLACS, XSDRN MULTIGROUP     572
LIBRARIES FROM ENDF/B DATA       WAPD 7600  F4     RS P   T E $ ETOT2, THERMAL     509
LIBRARIES, MUFT4 OR 5, GAM1 OR 2     WAPD 6600  BCD    R   L  T Z $ ETOG1 DATA     447
LIBRARY        LLL  7094  F+FAP RS PL  T M $ ECSIL, EXPERIMENTAL NEUTRON DATA     351
LIBRARY CAT. A-E  ANL   360  F+P+A RS      T P $ AMDLIBAE, ARGONNE SUBROUTINE     562
LIBRARY CAT. F    ANL   360  F+BAL RS      T P $ AMDLIBF, ARGONNE SUBROUTINE     563
LIBRARY CAT. G-Z  ANL   360  F+P+A RS      T P $ AMDLIBGZ, ARGONNE SUBROUTINE     564
LIBRARY FORM  WAPD 7600  F4     RS P   T B $ ETOT3, ENDF/B V3 DATA TO THERMAL     628
LIBRARY GROUP COLLAPSING  APRF 6600  F4     RS       B $ APRFX1, 99-GP DLC-2B     466
LIBRARY MAINTENANCE NED   635  F4     RS P   T M $ TROUT, MUG MULTIGROUP XSEC     493
LIBRARY MAINTENANCE NED  1108  F5     RS P   T M $ TROUT, MUG MULTIGROUP XSEC     493
LIBRARY PREPARATION     GGA  1108  F4     RS P X T L $ GAND, GAFGAR X-SECTION     345
LIBRARY ROUTINES LASL 6600E F+CCM RS      T P $ LASLIB, LOS ALAMOS SUBROUTINE     633
LIBRARY SERVICE ROUTINES  ANL  3600  36F    RSBP   T M $ MERMC2,MAGIC, MC**2     472
LIBRARY TAPE MAINTENANCE  ANL   360  F4     RS       M $ MERMC2, MC**2 BINARY     472
LIBRARY TAPE PREPARATION    PW   1604  F63    RS       L $ CSP1, SN X-SECTION     194
LIBRARY TAPE PREPARATION    PW   1604  F63    RS       L $ CSP2A, SN X-SECTION     193
LIBRARY UTILITY PROGRAM        AI   7094  F+FAP RS  L  T M $ MOMUS, X-SECTION     159
LIBRARY UTILITY ROUTINE      ANL  3600  F63    RSBP   T M $ XLIBIT, X-SECTION     181
LIBRARY UTILITY ROUTINE  AI    360  F4     RSB L  T M $ CLIP, FORM OR THREDES     271
LIBRARY, 30-GP ENDF/B SCAT KERNELS     DP   360  BCD    R   LX T Z $ THERMOS     543
LIFETIME ANALYSIS          ANL  3600  F36    RSBP    I $ SWELL2, FUEL ELEMENT     353
LIFE1, FAST REACTOR FUEL ELEMENT BEHAVIOR      ANL   360  F4     RS P   T I $     460
LIMITS   BKC   360  F4     RSBP     P $ GRAPH, LINEAR REGRESSION W/CONFIDENCE     624
LINEAR ELASTIC SINGULARITY MODELING    SLA  6600  FTN    RS P   T I $ CHILES,     611
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LINEAR ELASTIC STRUCTURAL DYNAMICS        BAPL 6600  F4     RS P   T I $ MO266,     383
LINEAR ELASTIC SYSTEMS BAPL 6600  F4     RS P   T I $ MO552, DYNAMIC ANALYSIS     283
LINEAR REGRESSION W/CONFIDENCE LIMITS    BKC   360  F4     RSBP      P $ GRAPH,     624
LINEAR SYSTEMS    ANL   360B F4     RS P  CT I $ SAP4, STRUCTURAL ANALYSIS OF      641
LINEARLY-CONSTRAINED OPTIMIZATION         CRNL  360  F4     RS P      P $ KEELE,     556
LION, 3-D TEMPERATURE DISTRIBUTION PROGRAM     CHI  1108  F4     RS P   T H $       299
LION4, 3-D TEMPERATURE DISTRIBUTION PROGRAM    KAPL 6600  F+ASC RS P   T H $       299
LIPRECAN1, MC NEUTRON PENETRATION CALCULATION  DAC  7090  F2     RSBP      J $     123
LIQUID BLOWDOWN ANALYSIS LOFT    UGA   360  F4     RS P      G $ WATER-HAMMER,      278
LIQUID-FILLED PIPING SYSTEM ANALYSIS      KE   3600B F36    RSBP      G $ WHAM,      278
LISTS UHTREX   LASL 7090  F+FAP RS P      I $ WIREX, COMPUTER-PRODUCED WIRING      315
LITHE,HELP, CRITICAL ANALYSIS SYSTEM      DP   360  F+BAL RS P XCT B $ HAMMER,       277
LIZARD, NONLINEAR DIFFERENTIAL EQNS. SOLUTION  KAPL 6600  F+ASC RS P   T P $       445
LLL   709  F2     RS        C $ FIRN, 2-D FEW-GP S4 APPROXIMATION RZ GEOMETRY        7
LLL   6600B F4    RS P      P $ GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER      592
LLL   7090  F+FAP RS P   T B $ SOPHIST1/2/5, MULTI-GP TRANSFER COEFFICIENTS        160
LLL   7090  F2    RS P      F $ CONFC, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE     129
LLL   7094  F+FAP RS PL  T M $ ECSIL, EXPERIMENTAL NEUTRON DATA LIBRARY            351
LLL   7094  F2    RS P      P $ EXPALS, LEAST SQUARES EXPONENTIAL DECAY CURVES     321
LMFBR POWER EXCURSION DISASSEMBLY   ANL   360  F4     RS P XCT F $ VENUS, 2-D      511
LMFBR ROD BUNDLE    NED   635  F4     RS P   T H $ VELVET2, TURBULENT FLOW IN       458
LOAD   GGA  7044  F4     RSBP  CT I $ SAFE-PORS, STRESS ANALYSIS AXISYMMETRIC      250
LOAD   BAPL 6600  F4     RS P   T I $ SEALSHELL2, SHELL STRESS ANALYSIS AXISYM     282
LOAD   SR   360   F4     RS P   T I $ SEALSHELL2, SHELL STRESS ANALYSIS AXISYM     282
LOAD   WTSC 6600B F4     RS P   T I $ SEAL SHELL, SHELL STRESS ANALYSIS AXISYM     282
LOAD GGA  7044  F4     RS P   T I $ SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC      251
LOCA       ANC   360  F4     RSBP X T G $ THETA1-B, FUEL ROD THERMAL RESPONSE       512
LOCA ANALYSIS DUKE POWER MCGUIRE UNITS DUCO  635  F4     RS        G $ ANVENT,      529
LOCA FISSION PRODUCT RELEASE ANALYSIS  BCL  6400  F4     RS P      G $ FRCRL2,      500
LOCA ROD BUNDLE CHF DATA ANALYSIS          ANC   360  F4     RS PL CT M $ ERREST,     518
LOFT   KE   7094  F+MAP RSBP   T G $ SATURATED BLOWDOWN2, BLOWDOWN ANALYSIS         200
LOFT   UGA  360   F4     RS P      G $ WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS       278
LOS ALAMOS SUBROUTINE LIBRARY ROUTINES LASL 6600B F+CON RS     T P $ LASLIB,       633
LOSS-OF-COOLANT & EMERGENCY COOLING        BCL  6400  F4     RS P   T G $ ECCSA4,     330
LOSS-OF-COOLANT ACCIDENT ANALYSIS          BAPL 6600  F4     RS P   T G $ FLASH3,     295
LOSS-OF-COOLANT ACCIDENT ANALYSIS  BAPL 6600  F4     RS P   T G $ MO555,ACT1,         284
LOSS-OF-COOLANT THERMAL ANALYSIS   BCL  6400  F4     RS P   T G $ NUKLOC-1.0,         328
LUMPED MASS    LASL 7030  F4     RS        T H $ RATH, 2- OR 3-D HEAT CONDUCTION    242
LUMPED MASS    LASL 7094  FAP    RS P      T H $ RATH, 2- OR 3-D HEAT CONDUCTION    242
LWBR FUEL SWELLING TEMPERATURE STUDY       BAPL 6600  F4     RS P   T H $ FIGRD,      272
LYNNE, WOODS-SAXON POTENTIAL SHAPE CALCULATION CRNL 7090  F2     RS        A $      381
MA-G  360  F4     RSBP  CT G $ FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION          448
MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY    ANL  3600  F63    RSBPL  T J $       143
MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY    BNW  7090  F2     RSBPL  T J $       143
MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  ANL  3600  F36    RS P X T C $       262
MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  MTS  360   F4     RSBPLXCT C $       262
MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  PURD 6500  F4     RS PLX T C $       262
MACS LATTICE VIBRATION NEUTRON SCATTRING CODES ANC  360   F4     RS P  CT W $       574
MAD   RSB        O $ BURP1, DETECTOR EFFICIENCY POINT SOURCE        MTS  7090       164
MAD   RSB        O $ BURP2, DETECTOR EFFICIENCY DISK SOURCE         MTS  7090       165
MAD   RSB        O $ BURP3, DETECTOR EFFICIENCY POINT SOURCE        MTS  7090       166
MAD   RSB        O $ BURP4, GAMMA-RAY PHOTOFRACTION SOLID CRYSTAL   MTS  7090       169
MAD   RSB        O $ BURP5, GAMMA-RAY PHOTOFRACTION WELL CRYSTAL    MTS  7090       170
MAGIC, MC**2 LIBRARY SERVICE ROUTINES      ANL  3600  36F    RSBP   T M $ MERMC2,    472
MAGNETIC NETWORK SOLUTION  BAPL 6600B F4     RS P   T I $ MANE1, RECTANGULAR          412
MAINTENANCE  ANL   360  F4     RS        M $ MERMC2, MC**2 BINARY LIBRARY TAPE      472
MAINTENANCE NED   635  F4     RS P   T M $ TROUT, MUG MULTIGROUP XSEC LIBRARY        493
MAINTENANCE NED  1108  F5     RS P   T M $ TROUT, MUG MULTIGROUP XSEC LIBRARY        493
MANAGEMENT  NED   635  F4     RS P   T D $ FUMBLE, FAST REACTOR FUEL BURNUP &        480
MANAGEMENT SYSTEM ALOO  360  COBOL RS P      M $ AEC-ALC FAL, RADIO FREQUENCY        587
MANAGEMENT, EDITING, & ANALYSIS    BAPL 6600  F4     RS P   T M $ SHLOG, DATA         557
MANE1, RECTANGULAR MAGNETIC NETWORK SOLUTION   BAPL 6600B F4     RS P   T I $       412
MANIPULATION  ANL   360  F4     RSBPL CT L $ ARC-XSEC1, MICROSCOPIC X-SECTION        594
MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS NED   635  F4     RS P   T H $       256
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MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS WARD 6600 F4 RS P T H $ 256
MANUFACTURING REQUIREMENTS GEPI GETS BASIC R M $ MAPPER, PREDICTING 595
MAPPER, PREDICTING MANUFACTURING REQUIREMENTS GEPI GETS BASIC R M $ 595
MARKOV SIMULATION OF REACTOR OPN DP 360 F4 RS P G $ INTEG,INSPEC, 590
MARS, 2-D EXCURSION CALCULATION R-Z GEOMETRY APDA 7094 F4 RS P F $ 293
MASS LASL 7030 F4 RS T H $ RATH, 2- OR 3-D HEAT CONDUCTION LUMPED 242
MASS LASL 7094 FAP RS P T H $ RATH, 2- OR 3-D HEAT CONDUCTION LUMPED 242
MASS MATRIX GENERATION BAPL 6600 F+COM RS P H $ HYMAS, HYDRODYNAMIC 560
MASS SPECTROMETRY RFD 360 F4 RS P U $ DYNAMIC ANALYSIS OF GASES BY 645
MATERIAL GEC 7090 FAP RSBP X T Q $ SPECTRA, MC CALCULATION IRRADIATED 422
MATERIAL BUCKLING CYL FUEL ELEMENTS AEB 360 F4 RS P B $ WELWING, 362
MATERIALS LASL 6600 F4 RS P T A $ TOR, THERMAL SCATTERING CRYSTALLINE 360
MATRICES AGC 7090 F2 RS P T B $ AGN-SIGMA, CALC OF MULTI-GP TRANSFER 243
MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL 360 F4 RSB XCT P $ EISPACK, 534
MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL 635 F4 RS X T P $ EISPACK, 534
MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL 1108 F4 RS X T P $ EISPACK, 534
MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL 6600 F4 RS X T P $ EISPACK, 534
MATRIX GENERATION BAPL 6600 F+COM RS P H $ HYMAS, HYDRODYNAMIC MASS 560
MATRIX GENERATION FOR A SYSTEM OF BEAMS KAPL 6600 F4 RS P I $ STEM, 337
MATUS, 3-D FINITE ELEMENT ELASTIC ANALYSIS BAPL 6600 F+COM RS P X T I $ 597
MAXIMUM MOMENT CALC AI 7090 F+FAP RS T I $ 4RESTRAINT PIPE STRESS, 109
MAXIMUM YIELD FROM REACTION OR DECAY ORNL 1604 F63 RS P D $ ISOTOPES, 179
MC ORNL 360B F+BAL RS P T B $ RAFFLE, 1ST FLIGHT COLLISION PROBABILITIES 392
MC CALCULATION IRRADIATED MATERIAL GEC 7090 FAP RSBP X T Q $ SPECTRA, 422
MC NEUTRON PENETRATION CALCULATION DAC 7090 F2 RSBP J $ LIPRECAN1, 123
MC NEUTRON, GAMMA-RAY HISTORIES PW 1604 F+COP RS P X T B $ FMC-N,FMC-G, 195
MC**2 BINARY LIBRARY TAPE MAINTENANCE ANL 360 F4 RS M $ MERMC2, 472
MC**2 DATA CONVERSION ANL 360 F4 RS P CT M $ ETCE, ENDF/B TO 350
MC**2 DATA CONVERSION APDA 3600 ASAF4 RS P T M $ ETCE, ENDF/B TO 350
MC**2 LIBRARY SERVICE ROUTINES ANL 3600 36F RSBP T M $ MERMC2,MAGIC, 472
MC**2, ENDF MULTIGROUP X-SECTION CALCULATION ANL 360 F4 RS P CT B $ 355
MC**2, ENDF MULTIGROUP X-SECTION CALCULATION ANL 3600 F36 RS P T B $ 355
MCGUIRE UNITS DUCO 635 F4 RS G $ ANVENT, LOCA ANALYSIS DUKE POWER 529
MCS, MONTE CARLO NEUTRON PENETRATION STUDY LASL 7090 FLOCO RS P B $ 202
MEASUREMENT ANALYSIS GEC 635 F4 RSBP C $ MICHRD, MICROHARDNESS 421
MEASUREMENTS GGA 1108 F4 RS P T A $ TACASI, ANALYSIS OF RESONANCE 410
MEDIA TLD CORRECTION CALC AI 360 F4 RS P T Q $ RESPOND, DISSIMILAR 566
MEDIUM SPECTRUM X-SECTIONS AI 7090 F+FAP RS L T B $ QUICKIE, INFINITE 119
MERMC2, MC**2 BINARY LIBRARY TAPE MAINTENANCE ANL 360 F4 RS M $ 472
MERMC2,MAGIC, MC**2 LIBRARY SERVICE ROUTINES ANL 3600 36F RSBP T M $ 472
MESH GGA 1108 F4 RS P T C $ GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z 380
MESH GGA 1108 F+BAL RS P T C $ GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR 401
MESH COLLAPSING TRW 6500 F4 RS P B $ PARTI, OPTIMAL GROUP OR 416
MESH GENERATION SLA 6600 F4 RS P T L $ GMESH,RENUM, SELF-ORGANIZING 612
MESH TRANSPORT PROGRAM LASL 360 F4 RSBP CT C $ TRIPLET, 2-D TRIANGULAR 608
MESH TRANSPORT PROGRAM LASL 6600 F4 RS P T C $ TRIPLET, 2-D TRIANGULAR 608
MESH TRANSPORT PROGRAM LASL 7600 F4 RS P T C $ TRIPLET, 2-D TRIANGULAR 608
METALLIC FISSION PRODUCT RELEASE GGA 1108 F4 RS P D $ FREVAF6, HTGR 301
METALS GEC 635 F+FAP RSBP T Q $ CASCADE,CLUSTER, RADIATION DAMAGE IN 419
MGBS,TGAN, NUCLEAR CRITICALITY SAFETY DP 360 F4 RS P T C $ KEFF, 617
MGDSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE PW 1604 LAG1 RS P C $ 211
MICHRD, MICROHARDNESS MEASUREMENT ANALYSIS GEC 635 F4 RSBP C $ 421
MICROHARDNESS MEASUREMENT ANALYSIS GEC 635 F4 RSBP C $ MICHRD, 421
MICROSCOPIC X-SECTION MANIPULATION ANL 360 F4 RSBFL CT L $ ARC-XSEC1, 594
MIRAB,MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL BCL 6400 F4 RS P X G $ 499
MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL BCL 6400 F4 RS P X G $ MIRAB, 499
MISH-MASH, RESONANCE INTEGRAL CALC HOMOGENEOUS ANL 3600 F36 RSBP A $ 214
MIST, 1-D FEW-GP SN DOUBLE SN APPROX SLAB GEOM PPCO 7090 F2 RS P C $ 59
MIT 360 F4 RS P T I $ SABOR4, DISCRETE-ELEMENT ANALYSIS THIN SHELLS 402
MIT 360B F+BAL RSBP T D $ PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION 336
MIT 370 F4 RS P T F $ GAKIN2, 1D MULTIGROUP TIME-DEPENDENT DIFFUSION 310
MIT 7090 F2 RS P P $ FRANTIC, LEAST SQUARES FIT SUM OF EXPONENTIALS 324
MIX KAPL 6600 F4 RS P H $ RAPP, HIGH-VELOCITY FLOW STUDY STEAM-WATER 382
MIXED ISOTOPES MLMO 360 F4 RSBP CT Q $ ISOTAB, PU POWER OUTPUT FROM 619

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ML-1 FLUID FLOW EXPERIMENT ANALYSIS    AGC  7090  F2    FS P     O $ CROC90,    154
MLMC  360  F+C+R RSBP   T M $ RALCRTPH, RESOURCE ALLOCATION PROJECT PLANNING   603
MLMC  360  F4    RSBP   C  P $ LATIN SQ, NXN LATIN SQUARE EXPERIMENTAL DESIGN  630
MLMC  360  F4    RSBP   CT Q $ ISOTAB, PU POWER OUTPUT FROM MIXED ISOTOPES     619
MMM3, COORDINATE ANALYSES SEMI-RIGID MOLECULES ANC   360  F4    RS P     W $   632
MODE   BAPL 6600  F4    RS P     P $ RELO1, RELIABILITY FOR A SINGLE FAILURE  497
MODE FAST REACTOR X-SEC CALC BNW  1108  F4    RS P   T B $ FCC4, FUNDAMENTAL   306
MODELING    SLA  6600  FTN   RS P   T I $ CHILES, LINEAR ELASTIC SINGULARITY   611
MODERATOR GGA  1108  F4    RS P     A $ GAKER, INELASTIC SCAT X-SECTION CALC  289
MODERATOR SPACE CHORD DIST FUNCT   AEG  7090  F2    RS       B $ DANCOFF JR,   150
MODIFIED BETTIS ENVIRNMNTL LIB SCOPE2.0 CEND 7600B F4    RS       T P $ MODEL,  478
MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.2 CDC  6600C F+CCM RS       T P $ MODEL,  478
MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.3 CDC  6600D F+CCM RS       T P $ MODEL,  478
MODULAR DOCUMENT INFORMATION SYSTEM    KAPL 6600B F+ASC RSB  X T M $ TIGIR2,   403
MODULAR PROGRAMMING AND DATA SYSTEM  KAPL 6600B F+CCM R       T M $ DATATRAN,  386
MODULE   ANL   360  F4    RSBP   CT L $ ARC-NU1002, BCD INPUT DATA PROCESSING  533
MODULES     ANL   360  F+BAL RS P   CT M $ ARC-SYSTEM, SYSTEM SUBPROGRAMS AND  522
MODULES   DP    360  F+BAL  S   X T B $ RAHAB, JOSHUA SYSTEM LATTICE PHYSICS   536
MODULES, 2-D + 3-D PLOTTING   KAPL 6600  F+ASC RS P   T P $ DATATRAN UTILITY  407
MODULES, 2-D & 3-D PLOTTING   KAPL 6600B F+ASC R       T P $ DATATRAN UTILITY 407
MOD5, STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN NPGS  360  F4    RS P X T E $   491
MOLECULES ANC   360  F4    RS P     W $ MMM3, COORDINATE ANALYSES SEMI-RIGID  632
MOLTEN FUEL TUBE BUNDLES  LASL 7094  F2    RSBP     H $ AXFLU, HEAT TRANSFER  182
MOMENT CALC    AI   7090  F+FAP RS     T I $ 4RESTRAINT PIPE STRESS, MAXIMUM  109
MOMUS, X-SECTION LIBRARY UTILITY PROGRAM       AI   7094  F+FAP RS  L  T M $   159
MONA, 1-D MULTIGROUP DIFFUSION SLAB, CYL, SPH  ANC   360  F4    RSBP  CT C $   582
MONITOR     SLAC  360  F+BAL RS     CT P $ PROGLOOK, USER PROGRAM PERFORMANCE 642
MONITOR SLAC  360  BAL   RS    CT P $ SLACMON 2.2, OS360 MVT/MFT PERFORMANCE  635
MONTE CARLO CALC NEUTRON HISTORIES      GGA  7044  F4    RS P   T B $ FMC-N,   195
MONTE CARLO CELL CALCULATION   AI    360  F+BAL RS P X T B $ HWOCR-SAFE, 2-D   307
MONTE CARLO CRITICAL ASSEMBLY ANALYSIS   AI   7600  F4    RS PLX T C $ VIM1,   510
MONTE CARLO CRITICAL ASSEMBLY ANALYSIS  AI-A  360  F4    RSBPL CT C $ VIM1X,  510
MONTE CARLO MULTIGROUP CRITICALITY CODE  CRNL  360  F+BAL RSBPL CT C $ KENO,   450
MONTE CARLO MULTIGROUP CRITICALITY CODE DP    360B F+BAL RSBP  CT C $ KENO2,  450
MONTE CARLO MULTIGROUP CRITICALITY CODE RFD  6600  F+CCM RS PLX T C $ KENO2,  450
MONTE CARLO NEUTRON PENETRATION STUDY     LASL 7090  FLOCC RS P     B $ MCS,   202
MONTE CARLO NEUTRON TRANSPORT CODE ANC   360  F4    RSBPL CT C $ RAFFLE-ANC,  631
MONTE CARLO REACTOR ANALYSIS CALCULATION  CRNL  360  F+BAL RSBPL CT C $ ESP,   523
MONTE CARLO SLOWING-DOWN DENSITY CALC  AI   7094  F+FAP RS PL  T B $ TYCHE3,  149
MORTIMER, DOSE RATE CALCULATION SNAP GEOMETRY  AI   7090  F2    RS       J $   142
MOST, A MULTIDIMENSIONAL OPTIMIZATION SCHEME   KAPL 6600  F4    RS P     P $   446
MOTION SOLUTION SLA  3600  F36   RS P   T S $ TOODY2, 2-D LAGRANGIAN EQNS OF   627
MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC      ANC   360  F4    RSBP XCT H $   551
MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC      ANC  1108  F4    RS P   T H $   551
MSCAT, SLOW NEUTRON MULTIPLE SCATTERING CALC   ANL   360  F4    RS P  CT W $   575
MSS   360  F4    RS P     H $ FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW       246
MSS   360  F4    RS P   CT C $ FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION    167
MTS   360  F4    RSBPLXCT C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    262
MTS  7090  MAD   RSB      O $ BURP1, DETECTOR EFFICIENCY POINT SOURCE          164
MTS  7090  MAD   RSB      O $ BURP2, DETECTOR EFFICIENCY DISK SOURCE           165
MTS  7090  MAD   RSB      O $ BURP3, DETECTOR EFFICIENCY POINT SOURCE          166
MTS  7090  MAD   RSB      O $ BURP4, GAMMA-RAY PHOTOFRACTION SOLID CRYSTAL     169
MTS  7090  MAD   RSB      O $ BURP5, GAMMA-RAY PHOTOFRACTION WELL CRYSTAL      170
MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC   BCL  6400  F4    RS P X T G $   508
MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC   BCL  6400  F4    RS P X T G $ MUCHA1,  508
MUFFLE, FISSILE NUCLIDE X-SECTION EVALUATION   ORNL 7090  F4    RSBP     A $   323
MUFT FORMAT X-SECTIONS WAPD 6600  F4    RS P   T B $ ETOM1, ENDF/B FORMAT TO  436
MUFT, GAM, ANISN X-SEC FORMAT WAPD 6600  F4    RS PL  T E $ ETOG1, ENDF/B TO 437
MUFT, GAM, ANISN X-SEC FORMAT WAPD 7600  F4    RS P   T B $ ETOG3, ENDF/B TO 538
MUFT4 OR 5, GAM1 OR 2    WAPD 6600  BCD   R   L  T Z $ ETOG1 DATA LIBRARIES,  447
MUG MULTIGROUP XSEC LIBRARY MAINTENANCE NED   635  F4    RS P   T M $ TROUT,  493
MUG MULTIGROUP XSEC LIBRARY MAINTENANCE NED  1108  F5    RS P   T M $ TROUT,  493
MULTI-CHANNEL 2-D 2-PHASE FLOW     AI   7094  F2    RS P     H $ FLOW-MODEL,  246
MULTI-CHANNEL 2-D 2-PHASE FLOW     MSS   360  F4    RS P     H $ FLOW-MODEL,  246
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MULTI-GP CONSTANT & FAST SPECTRA CALC   ANC   360  F4    RS PLXCT B $ PHRCG,    520
MULTI-GP CONSTANT CALC  AGC  7090  F+FAP RSBPLX T B $ AGN-GAM, FAST SPECTRUM  204
MULTI-GP CONSTANT CALC 0 TO 10 MEV    BC    625  F4    RS PLX T B $ GAMTEC2,  185
MULTI-GP CONSTANT CALC 0 TO 10 MEV    BNW  1107  F4    RS PL  T B $ GAMTEC2,  185
MULTI-GP CONSTANT CALC 0 TO 10 MEV    BNW  7090  F+FAP RS PL  T B $ GAMTEC2,  185
MULTI-GP CONSTANT CALC 0 TO 10 MEV    UVA  6400  F4    RS PLX T B $ GAMTEC2,  185
MULTI-GP CONSTANTS   ANC   360  F4    RS PL CT B $ INCITE, THERMAL SPECTRA &  565
MULTI-GP CONSTANTS FROM ENDF/B FOR 10X  HEGL 1108B F4    RS P X T B $ ETOX3,   388
MULTI-GP DIFFUSION     UMCC  360  F4    RS P   T C $ VARI-QUIR, TIME-DEP 2-D   212
MULTI-GP DIFFUSION     WANL 6600  F4    RS P   T C $ VARI-QUIR, TIME-DEP 2-D   212
MULTI-GP DIFFUSION + LIB   AI    360  F4    RSBPLX T C $ CAFSAR4,LIBLST, 1-D   276
MULTI-GP DIFFUSION & INVENTORY . ANL   360  F4    RSBP  CT C $ ARC-DIF1D, 1-D   626
MULTI-GP DIFFUSION DEPLETION CODE ORNL 7090  F+FAP RS P   T C $ ASSAULT, 2-D   240
MULTI-GP DIFFUSION PROGRAM   AAEC  360  F+BAL RS P   T C $ CRAM, 1-D AND 2-D   103
MULTI-GP DIFFUSION PROGRAM   ORNL 7090  F+FAP RS P   T C $ EXTERMINATOR, 2-D   156
MULTI-GP DIFFUSION PROGRAM   UK-R 7090  F+FAP RSBPL  T C $ CRAM, 1-D AND 2-D   103
MULTI-GP DIFFUSION PROGRAM  BC    625  F4    RS     T C $ EXTERMINATOR2, 2-D   156
MULTI-GP DIFFUSION PROGRAM  CE   6600  F4    RS P   T C $ EXTERMINATOR2, 2-D   156
MULTI-GP DIFFUSION PROGRAM  ORNL  360  F4    RS P   T C $ EXTERMINATOR2, 2-D   156
MULTI-GP DIFFUSION SLAB CYL SPHERE    BNW  1107  F4    RS P   T C $ FFN, 1-D   241
MULTI-GP DIFFUSION SLAB CYL SPHERE   AI   7090  F+FAP RS  L  T C $ FAIM, 1-D   120
MULTI-GP DIFFUSION SLAB CYL SPHERE   AI   7090  F+FAP RS PL  T C $ AIM6, 1-D    29
MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604  F63   RS PL  T C $ AIM6, 1-D    29
MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604  F63   RS PLX T C $ FAIM, 1-D   120
MULTI-GP DIFFUSION SLAB CYL SPHERE   CSUC  370  F4    RS PL CT C $ AIM6, 1-D    29
MULTI-GP DIFFUSION SLAB CYL SPHERE  AI   7090  F+FAP RS  L  T C $ ULCER, 1-D   118
MULTI-GP DIFFUSION SLAB CYL SPHERE  ANL  3600  F36   RS P X T C $ MACH1, 1-D   262
MULTI-GP DIFFUSION SLAB CYL SPHERE  MTS   360  F4    RSBPLXCT C $ MACH1, 1-D   262
MULTI-GP DIFFUSION SLAB CYL SPHERE  PURD 6500  F4    RS PLX T C $ MACH1, 1-D   262
MULTI-GP DIFFUSION SLAB CYL SPHERE BHSC  360  F4    RS P   T C $ FAIMOS, 1-D   120
MULTI-GP DIFFUSION SYNTHESIS CALC   NED   635  F4    RS PL  T C $ BISYN, 2-D   287
MULTI-GP DIFFUSION SYNTHESIS CALC   NED  1108  F4    RS P   T C $ BISYN, 2-D   287
MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  1108  F+BAL RS P   T C $ GAMBLE5, 2-D   222
MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  7044  F+MAP RSBP   T C $ GAMBLE4, 2-D   222
MULTI-GP DIFFUSION XY RZ RTH   WANL 7094  F4    RS P X T C $ VARI-QUIR3, 2-D   264
MULTI-GP DISCRETE ORDINATE CALC      AI   7090  F2    RS PLX T C $ DTF2, 1-D   151
MULTI-GP DISCRETE ORDINATE CALC      AI    360  F4    RSBPLX T C $ ANISN, 1-D   151
MULTI-GP DISCRETE ORDINATE CALC  ANL  3600  F36   RS P   T C $ SNARG-1D, 1-D   288
MULTI-GP DISCRETE ORDINATE CODE      GGA  1108  F5    RS P   T C $ 2DF, 2-D   173
MULTI-GP DISCRETE ORDINATE CODE      UNC  1604  F63   RS       C $ 2DF, 2-D   173
MULTI-GP DISCRETE ORDINATE PROGRAM   ANL   360  F+BAL RS P   T C $ DTF4, 1-D   209
MULTI-GP DISCRETE ORDINATE PROGRAM   BC    625  F+MAP RS P   T C $ DTF4, 1-D   209
MULTI-GP DISCRETE ORDINATE PROGRAM   LASL 6600  F4    RS P   T C $ DTF4, 1-D   209
MULTI-GP DISCRETE ORDINATE PROGRAM   LASL 7030  F4    RS P   T C $ DTF4, 1-D   209
MULTI-GP DISCRETE ORDINATE PROGRAM   LER  7094  F4    RS P   T C $ DTF4, 1-D   209
MULTI-GP DOUBLE SN APPROX     BNW  7090  FLCCC RSBP   T C $ GE-HAPO-S13, 1-D    75
MULTI-GP DTF4 WITH DEPLETION     LASL 7030  F4    RS P   T D $ DTF-BURN, 1-D   269
MULTI-GP FLUX SYNTHESIS PROGRAM CYL PW   1604  F63   RS     T C $ 2DXYL, 3-D   192
MULTI-GP SN APPROX SLAB CYL SPHERE  PW   1604  LAG1  RS P     C $ MGDSN, 1-D   211
MULTI-GP SN APPROX SLAB CYL SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN, 1-D   132
MULTI-GP SN APPROXIMATION RZ  PW   1604  F63   RS P   T C $ FORTRAN TDC, 2-D   161
MULTI-GP SN APPROXIMATION XY GEOM    AGC  7090  FLCCO RSBP     C $ 2DXY, 2-D    18
MULTI-GP TRANSFER COEFFICIENTS   LLL  7090  F+FAP RS P   T B $ SCPHIST1/2/5,   160
MULTI-GP TRANSFER MATRICES  AGC  7090  F2    RS P   T B $ AGN-SIGMA, CALC OF   243
MULTI-GP TRANSPORT XY RZ RTHETA  LASL  3600 F4    RSBP  CT C $ TWOTRAN2, 2-D   358
MULTI-GP TRANSPORT XY RZ RTHETA  LASL 6600D F4    RS P   T C $ TWOTRAN2, 2-D   358
MULTI-GP TRANSPORT XY RZ RTHETA  LASL 7600D F4    RS P   T C $ TWOTRAN2, 2-D   358
MULTI-GP X-SECTIONS   LASL 7090  FLCCO RS P     B $ ZOT, GROUP-COLLAPSING OF  113
MULTI-GP X-SECTIONS FAST THERMAL SPECTRA GGA  1108  F4    RS PLX T B $ GGC4,   298
MULTI-GP X-SECTIONS FAST THERMAL SPECTRA GGA  6600  F4    RS  L  T B $ GGC4,   298
MULTI-LEVEL CONVOLUTION   PPCO 7040  F+MAP RS P     A $ COMBCO, COMBINED B-W  203
MULTI-LEVEL RESONANCE THEORY XSEC CALC  KAPL 6600  F4    RS P     A $ MULTI,   535
MULTI-PIN FUEL ELEMENT    AGC  7090  F2    RS P     B $ BOUNCE, FLUX DIST IN  237
MULTI, MULTI-LEVEL RESONANCE THEORY XSEC CALC  KAPL 6600  F4    RS P     A $   535
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MULTIANCHOR PIPE SYSTEM  AI    360  F4    RS P  CT I $ PSA2, STRESS ANALYSIS    542
MULTIDIMENSIONAL OPTIMIZATION SCHEME   KAPL 6600  F4    RS P     P $ MOST, A    446
MULTIGP  ORNL  360H F4    RS P   T K $ CITATION, 1,2,3-D DIFFUSION DEPLETION    387
MULTIGP CONSTANTS BNW  1108  F4    RS PLX T B $ HRG3, SLOWING-DOWN SPECTRUM,     467
MULTIGP CONSTANTS TVA   360  F4    RS PLX T B $ HRG3, SLOWING-DOWN SPECTRUM,     467
MULTIGP DIFF & 1GP DEPLETION NED   635  F+GMP PS P   T D $ SYN, 2D SYNTHESIS     495
MULTIGP DIFFUSION TRIANGULAR MESH  GGA  1108  F+BAL RS P   T C $ GAMTRI, 2-D     401
MULTIGP DIFFUSION+BURNUP TRI-MESH  GGA  1108  F+BAL RS P   T D $ BUGTRI, 2-D     439
MULTIGP KINETICS WITH TEMP FEEDBACK GGA  1108  F4    RS P   T F $ GAKIT, 1-D     370
MULTIGROUP CONSTANTS  ORNL  360  F4    RS PLX T B $ XSDRN, DISCRETE ORDINATE     393
MULTIGROUP CONSTANTS FROM ENDF/B DATA GESV  635  F+GMP RS P XCT B $ ENDRUN2,     501
MULTIGROUP CRITICALITY CODE  ORNL  360  F+BAL RSBPL CT C $ KENO, MONTE CARLO     450
MULTIGROUP CRITICALITY CODE DP    360B F+BAL RSBP  CT C $ KENO2, MONTE CARLO     450
MULTIGROUP CRITICALITY CODE RFD  6600  F+CCM RS PLX T C $ KENO2, MONTE CARLO     450
MULTIGROUP DIFFUSION & BURNUP XY, RZ GGA  1108  F+BAL RS P   T D $ BLG2, 2-D     438
MULTIGROUP DIFFUSION & SN THEORY   NED  635  F4    RS P   T C $ DOT2DB, 2-D     459
MULTIGROUP DIFFUSION AND DEPLETION    ANL  3600  F4    RSBP   T C $ 2DB, 2-D     325
MULTIGROUP DIFFUSION AND DEPLETION    BNW  1108  F4    RS P   T D $ 2DB, 2-D     325
MULTIGROUP DIFFUSION AND DEPLETION    LASL 6600  F4    RS P   T C $ 2DB, 2-D     325
MULTIGROUP DIFFUSION AND DEPLETION GGA  1108  F4    RS P   T D $ FEVER7, 1-D     318
MULTIGROUP DIFFUSION BURNUP ANALYSIS  ANL  360  F4    RS P  CT C $ 3DB, 3-D     567
MULTIGROUP DIFFUSION BURNUP ANALYSIS  HEDL 1108  F4    RS P   T C $ 3DB, 3-D     567
MULTIGROUP DIFFUSION DEPLETION     AI    360  F4    RSBP X T D $ SIZZLE, 1-D      58
MULTIGROUP DIFFUSION DEPLETION     AI   7090  F2    RS  L  T D $ SIZZLE, 1-D      58
MULTIGROUP DIFFUSION DEPLETION     CDC  1604  F63   RS  L  T D $ SIZZLE, 1-D      58
MULTIGROUP DIFFUSION SLAB, CYL, SPH  ANC  360  F4    RSBP  CT C $ MONA, 1-D     582
MULTIGROUP DIFFUSION SLAB, SPH, CYL GGA  1108  F+BAL RS P   T C $ GAZE2, 1-D     430
MULTIGROUP DIFFUSION XYZ R-THETA-Z   LASL 6600  F4    RS P   T C $ 3DDT, 3-D     463
MULTIGROUP DISCRETE ORDINATE CALC     UNC  1604  F63   RS PL  T C $ DTF, 1-D     144
MULTIGROUP DISCRETE ORDINATE PROGRAM LER  7090  F+MAP RS P   T C $ TOSN, 2-D     312
MULTIGROUP LIBRARIES FROM ENDF/B  ORNL  360  F4    RSBP XCT B $ XLACS, XSDRN     572
MULTIGROUP REACTOR KINETICS PROGRAM  ORNL  360  F4    RS P XCT F $ TASK, 1-D     558
MULTIGROUP SLAB GEOMETRY    ANL  3600  F63   RSBPL  T J $ MAC, SHIELD DESIGN     143
MULTIGROUP SLAB GEOMETRY    BNW  7090  F2    RSBPL  T J $ MAC, SHIELD DESIGN     143
MULTIGROUP TIME-DEPENDENT DIFFUSION MIT   370  F4    RS P   T F $ GAKIN2, 1D     310
MULTIGROUP X-SECTION CALCULATION   ANL  360  F4    RS P  CT B $ MC**2, ENDF     355
MULTIGROUP X-SECTION CALCULATION   ANL  3600  F36   RS P   T B $ MC**2, ENDF     355
MULTIGROUP XSEC LIBRARY MAINTENANCE NED  635  F4    RS P   T M $ TROUT, MUG      493
MULTIGROUP XSEC LIBRARY MAINTENANCE NED  1108  F5    RS P   T M $ TROUT, MUG      493
MULTILEVEL R-W X-SEC CALC    BNL  6600  F4    RS P     A $ SIGPLOT, RESOLVED     377
MULTIPLE CHANNEL ANALYSIS ECC   BCL  6400  F4    RS P X T G $ MUCHA1,MUCHA2,      508
MULTIPLE SCATTERING CALC   ANL  360  F4    RS P  CT W $ MSCAT, SLOW NEUTRON     575
MUSCAT, VIEW FACTOR SHIELDING CODE CAVITY GEOM GGA  1108  F4    RS P   T J $      259
MVT REMOTE JOB ENTRY SYSTEM   ANC  360  BAL   RSB    T P $ NRTS-RJE, OS/360      519
MVT/MFT PERFORMANCE MONITOR SLAC  360  BAL   RS    CT P $ SLACMON 2.2, OS360    635
M0102, POINT DEPLETION FISSION PRODUCT  BAPL 6600  F4    RS P     D $ CINDER,    313
M0102, POINT DEPLETION FISSION PRODUCT  DP    360  F+BAL RS P   T D $ CINDER,    313
M0219, PWR FLOW TRANSIENT ANALYSIS        BAPL 6600  F4    RS P   T H $ FLOT1,  331
M0266, LINEAR ELASTIC STRUCTURAL DYNAMICS       BAPL 6600  F4    RS P   T I $    383
M0457,PIPE, ELASTIC STRESS OF PIPING SYSTEM     BAPL 6600  F4    RS P   T I $    329
M0552, DYNAMIC ANALYSIS LINEAR ELASTIC SYSTEMS BAPL 6600  F4    RS P   T I $    283
M0555,ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS   BAPL 6600  F4    RS P   T G $    284
M0626, POLYNOMIAL CURVE FITTING    BAPL 6600  F4    RS P   T P $ M0661,M0657,    411
M0648, 1-D SLAB TRANSPORT WITH SLOWING DOWN     BAPL 6600  F4    RS     T C $    342
M0657,M0626, POLYNOMIAL CURVE FITTING    BAPL 6600  F4    RS P   T P $ M0661,    411
M0661,M0657,M0626, POLYNOMIAL CURVE FITTING     BAPL 6600  F4    RS P   T P $    411
M0756,LETO, 1-D SLAB GAMMA-RAY TRANSPORT        BAPL 6600  F4    RS P   T J $    343
M0807, 2-D DIFFUSION ABSORPTION REMOVAL X-SECS BAPL 6600  F4    RS     T B $    280
M0899,HOH, STEAM TABLES 14.5-2538 PSIA          ANL  1604  F63   RS P     H $    294
M0899,HOH, STEAM TABLES 14.5-2538 PSIA          BAPL 6600  F4    RS P   T H $    294
NAP, NEUTRON-INDUCED GAMMA-RAY RADIOACTIVITY    IITR 7094  F4    RSBPLX T D $    314
NEARREX, COMPOUND NUCLEUS X-SECTION CALC        ANL  3600  F63   RSBP     A $    171
NED   635  F+GMP RS      T P $ GENED ENVIRONMENTAL ROUTINES, SUBROUTINE LIB.     515
NED   635  F+GMP PS P   T D $ SYN, 2D SYNTHESIS MULTIGP DIFF & 1GP DEPLETION     495
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NED   635  F4    RS P     D $ RAPFU, FUEL CYCLE PARAMETERS FAST BREEDERS          372
NED   635  F4    RS P   T B $ REAX, RESOLVED RESONANCE EPITHERMAL X-SECTIONS      257
NED   635  F4    RS P   T C $ DOT2DB, 2-D MULTIGROUP DIFFUSION & SN THEORY        459
NED   635  F4    RS P   T C $ FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION        167
NED   635  F4    RS P   T D $ FUMBLE, FAST REACTOR FUEL BURNUP & MANAGEMENT       480
NED   635  F4    RS P   T G $ FREADM1, FAST REACTOR CORE ACCIDENT ANALYSIS        479
NED   635  F4    RS P   T H $ MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS      256
NED   635  F4    RS P   T H $ VELVET2, TURBULENT FLOW IN LMFBR ROD BUNDLE         458
NED   635  F4    RS P   T M $ TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE      493
NED   635  F4    RS P   T O $ BURNUP, HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS      311
NED   635  F4    RS P   T O $ EXPN, ANALYSIS OF PULSED NEUTRON SOURCE DATA        258
NED   635  F4    RS P X T F $ FORE2, FAST REACTOR EXCURSION CALCULATIONS          174
NED   635  F4    RS PL  T C $ BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC        287
NED  1108  F4    RS P   T C $ BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC        287
NED  1108  F5    RS P   T M $ TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE      493
NED  2000  F2    RS P     A $ DOPIE, RESOLVED RESONANCE X-SECTION CALC            177
NED  2000  F2    RS P     A $ RAPTURE, RESONANCE INTEGRAL X-SECTION CALC          176
NED  2000  F2    RS P     B $ SPARTA, SPATIALLY-AVERAGED DOPPLER EFFECTS          178
NED  2000  F4    RS P   T F $ FORE, FAST REACTOR EXCURSION CALCULATIONS           174
NED  7094  F+FAP RS P   T B $ EPITHERMOS, SPECTRUM AND X-SECTION CALCULATION     201
NETWORK SOLUTION   BAPL 6600B F4    RS P   T I $ MANE1, RECTANGULAR MAGNETIC     412
NEUTRON AGE CALCULATION OF ENDF/B DATA  BAPL 6600  F4    RS P   T B $ EPOCH,     461
NEUTRON DATA LIBRARY       LLL  7094  F+FAP RS PL  T M $ ECSIL, EXPERIMENTAL     351
NEUTRON FLUX-DOSIMETER ACTIVITY RELATION  GEC   635  F4    RSBP     C $ DOS,     423
NEUTRON HISTORIES       GGA  7044  F4    RS P   T B $ FMC-N, MONTE CARLO CALC     195
NEUTRON MULTIPLE SCATTERING CALC   ANL   360  F4    RS P  CT W $ MSCAT, SLOW     575
NEUTRON PENETRATION CALCULATION  DAC  7090  F2    RSBP     J $ LIPRECAN1, MC    123
NEUTRON PENETRATION STUDY      LASL 7090  FLCCC RS P     B $ MCS, MONTE CARLO    202
NEUTRON POLARIZATION EXPERIMENT     UCND  360B F+BAL RS P     D $ PMS1, FAST     469
NEUTRON SCATTRING CODES ANC   360  F4    RS P  CT W $ MACS LATTICE VIBRATION     574
NEUTRON SLOWING-DOWN NPGS  360  F4    RS P X T E $ MOD5, STOCHASTIC MODEL OF    491
NEUTRON SOURCE DATA   NED   635  F4    RS P   T O $ EXPN, ANALYSIS OF PULSED     258
NEUTRON SOURCE DATA ANALYSIS   CNEA  360  F4    RS P     E $ TRIFIDO, PULSED    489
NEUTRON SPECTRUM X-SECTION CALC     AI   7090  F2    RS PL  T B $ FORM, FAST     51
NEUTRON SPECTRUM X-SECTION CALC     ANL  3600  F63   RS  LX T B $ GAM1, FAST     33
NEUTRON SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PL  T B $ FORM, FAST     51
NEUTRON SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PLX T B $ GAM1, FAST     33
NEUTRON SPECTRUM X-SECTION CALC     GGA  7090  F2    RS PLX T B $ GAM1, FAST     33
NEUTRON SPECTRUM X-SECTION CALC     OSUC  370  F4    RS PLXCT B $ FORM, FAST     51
NEUTRON SPECTRUM X-SECTIONS  AI   7090  F+FAP RS PL  T B $ TEMPEST2, THERMAL     50
NEUTRON SPECTRUM X-SECTIONS  BHSC  360  F4    RS PL  T B $ TEMPEST2, THERMAL     50
NEUTRON SPECTRUM X-SECTIONS  CDC  1604  F63   RS PL  T B $ TEMPEST2, THERMAL     50
NEUTRON TRANSPORT CODE ANC   360  F4    RSBPL CT C $ RAFFLE-ANC, MONTE CARLO    631
NEUTRON X-SECTION CALCULATION    BAPL 6600  F4    RS P   T A $ SUMOR, S-WAVE    399
NEUTRON-HYDRODYNAMICS  APDA 7094  F2    RS P     F $ WEAK EXPLOSION, COUPLED    145
NEUTRON-INDUCED GAMMA-RAY RADIOACTIVITY  IITR 7094  F4    RSBPLX T D $ NAP,     314
NEUTRON, GAMMA-RAY HISTORIES   PW   1604  F+CDP RS P X T B $ FMC-N,FMC-G, MC    195
NEUTRONICS-HYDRODYNAMICS CODE AGC  7090  F2    RSB      F $ HATCHET, COUPLED    153
NEUTRONICS-HYDRODYNAMICS SPH   PW   1604  F63   RS P     F $ AX-TNT, COUPLED     191
NEUTRONICS-HYDRODYNAMICS SPHERE  CDC  3600  F63   RSBP     F $ AX1, COUPLED     102
NEUTRONICS-HYDRODYNAMICS SPHERE LLL  7090  F2    RS P     F $ CONEC, COUPLED     129
NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK BNL  6600  F4    RS P   T F $      405
NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES     BNW  1108  F5    RS P X T F $      488
NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES     BNW  7090  F4    RS P   T F $      488
NON-SPHERICAL OPTICAL MODEL X-SECTIONS  AI   7094  F2    RS P   T A $ 2PLUS,     254
NON-SPHERICAL OPTICAL MODEL X-SECTIONS  ANL  3600  F63   RSBP   T A $ 2PLUS,     254
NONLINEAR ALGEBRAIC EQN SOLN CURVE PLOT  KAPL 6600  F+ASC RS P   T P $ SNEQ,     364
NONLINEAR DIFFERENTIAL EQNS. SOLUTION  KAPL 6600  F+ASC RS P   T P $ LIZARD,     445
NONLINEAR LEAST SQ LENS DESIGN SYSTEM LASL 6600  F+COM RS P   T P $ LENSDES,     602
NOWIG, 1-D 2-GP KINETICS TEMPERATURE FEEDBACK  BAPL 6600  F4    RS P   T F $      371
NPGS  360  F4    RS P X T E $ MOD5, STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN     491
NPRECOP, FUEL CYCLE COSTS PERFORMANCE DATA     ANL  360  F4    RS P     D $      146
NPRECOP, FUEL CYCLE COSTS PERFORMANCE DATA     UEC  6600  F4    RS P     D $      146
NPTS ENVIRONMENTAL ROUTINES, FORTRAN UTILITIES ANC   360  F+BAL RS      T P $    613
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NRTS-RJE, OS/360 MVT REMOTE JOB ENTRY SYSTEM   ANC   360  BAL   RSB    T P $    519
NUBOW, STRUCTURAL ANALYSIS BCWFD REACTOR CORES ANL   360P F4    RS P    I $    643
NUCLEAR CRITICALITY SAFETY     DP    360  F4    RS P   T C $ KEFF,MGBS,TGAN,    617
NUCLEAR FUEL CYCLE COST AND ECONOMICS  CWF   360  F4    RS P   T D $ CINCAS,    354
NUCLEAR FUEL CYCLE COST AND ECONOMICS  WAPD 6600  F4    RS P   T D $ CINCAS,    354
NUCLEAR FUEL CYCLE ECONOMICS  UICS  360  F4    RS P  CT D $ GEM, ANALYSIS OF    576
NUCLEAR POWER PLANT COST CODE HEDL 1108  F5    RS P X T C $ PACTOLUS,CLOTHO,    540
NUCLEAR STATION ELECTRICITY COSTS     ORNL 1604  F63   RS P     C $ POWERCO,    340
NUCLEAR STATION ELECTRICITY COSTS     UEC  6600  F4    RS P     D $ POWERCO,    340
NUCLEUS REACTION     AI    360  F+BAL RS P   T A $ COMNUC,CASCADE, COMPOUND     482
NUCLEUS X-SECTION CALC       ANL  3600  F63   RSBP     A $ NEARREX, COMPOUND    171
NUCLIDE CHAIN EQUATIONS      ORNL 7090  F2    RSBP     D $ NUCY, SOLUTION OF    134
NUCLIDE DATA  BAPL 6600  F4    RS P   T P $ DAFT1, LEAST SQUARES FIT FISSILE    327
NUCLIDE X-SECTION EVALUATION   ORNL 7090  F4    RSBP     A $ MUFFLE, FISSILE      323
NUCY, SOLUTION OF NUCLIDE CHAIN EQUATIONS      ORNL 7090  F2    RSBP     D $     134
NURLOC-1.0, LOSS-OF-COOLANT THERMAL ANALYSIS   BCL  6400  F4    RS P   T G $     328
NXN LATIN SQUARE EXPERIMENTAL DESIGN MLMO  360  F4    RSBP  C  P $ LATIN SQ,   630
ONE-GP SPACE-TIME DIFFUSION FEEDBACK BNL  6600  F4    RS P   T F $ NCAH, 1-D   405
OPN  OPPD 6400  F4     S P     H $ PWR-PPM, BORATION-DILUTION TABLES FOR PWR    552
OPN DP    360  F4    RS P     G $ INTEG,INSPEC, MARKOV SIMULATION OF REACTOR   590
OPPD 6400  F4     S P     H $ PWR-PPM, BORATION-DILUTION TABLES FOR PWR CPN    552
OPTICAL MODEL X-SECTIONS  AI   7094  F2    RS P   T A $ 2PLUS, NON-SPHERICAL   254
OPTICAL MODEL X-SECTIONS  ANL  3600  F63   RSBP   T A $ 2PLUS, NON-SPHERICAL   254
OPTIMAL GROUP OR MESH COLLAPSING        TRW  6500  F4    RS P     B $ PARTI,   416
OPTIMIZATION        ORNL  360  F4    RS P     P $ KEELE, LINEARLY-CONSTRAINED  556
OPTIMIZATION   AI   7090  F2    RS       I $ CROCK, SPACE POWER PLANT DESIGN  112
OPTIMIZATION   AI   7090  F2    RS       I $ SHOCK, SPACE POWER PLANT DESIGN  114
OPTIMIZATION DOSE CALC     AI   7094  F+FAP RS P     J $ SHOE, SHIELD WEIGHT  197
OPTIMIZATION SCHEME   KAPL 6600  F4    RS P     P $ MOST, A MULTIDIMENSIONAL  446
OPTIMIZATION STUDY    PW   1604  F63   RS       I $ WOPEXPRT, REACTOR WEIGHT 190
OPUS, POWER PLANT PERFORMANCE AND PRICE STUDY  GGA  7044  F+MAP RS P   T D $  226
ORCOST, POWER PLANT CAPITAL COST ESTIMATING    ORNL  360B F4    RS P   T C $  588
ORDINARY DIFF EQNS   ORNL 6600  F4    RS P     P $ FORSIM, SOLN OF SYSTEM OF 514
ORDINARY DIFF EQUATIONS SLA   360  F4    RS P X T P $ DE/STEP,INTRP, SOLN OF 640
ORDINARY DIFF EQUATIONS SLA  6600  F4    RS P X T P $ DE/STEP,INTRP, SOLN OF 640
ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER  ANL   360B F4    RS P   C  P $ GEAR, 592
ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER  LLL  6600B F4    RS P     P $ GEAR, 592
ORDINATE CALC       AI   7090  F2    RS PLX T C $ DTF2, 1-D MULTI-GP DISCRETE 151
ORDINATE CALC      AI    360  F4    RSBPLX T C $ ANISN, 1-D MULTI-GP DISCRETE 151
ORDINATE CALC      UNC  1604  F63   RS PL  T C $ DTF, 1-D MULTIGROUP DISCRETE 144
ORDINATE CALC  ANL  3600  F36   RS P   T C $ SNARG-1D, 1-D MULTI-GP DISCRETE 288
ORDINATE CODE        GGA  1108  F5    RS P   T C $ 2DF, 2-D MULTI-GP DISCRETE 173
ORDINATE CODE        UNC  1604  F63   RS       C $ 2DF, 2-D MULTI-GP DISCRETE 173
ORDINATE MULTIGROUP CONSTANTS  ORNL  360  F4    RS PLX T B $ XSDRN, DISCRETE 393
ORDINATE PROGRAM   ANL   360  F+BAL RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE 209
ORDINATE PROGRAM   BC    625  F+MAP RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE 209
ORDINATE PROGRAM   LASL 6600  F4    RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE 209
ORDINATE PROGRAM   LASL 7030  F4    RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE 209
ORDINATE PROGRAM   LER  7094  F4    RS P   T C $ DTF4, 1-D MULTI-GP DISCRETE 209
ORDINATE PROGRAM LER  7090  F+MAP RS P   T C $ TDSN, 2-D MULTIGROUP DISCRETE 312
ORDINATES SLAB GEOMETRY  BAPL 6600  F4    RS P   T C $ BE21, FEW-GP DISCRETE 398
ORNL  360  BAL+F RS P  CT P $ GETCOR,FRECOR, FORTRAN DYNAMIC STORAGE ALLOC   644
ORNL  360  F+BAL RS P     D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC 322
ORNL  360  F+BAL RS P   T I $ SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY 332
ORNL  360  F+BAL RSBPL CT C $ ESP, MONTE CARLO REACTOR ANALYSIS CALCULATION 523
ORNL  360  F+BAL RSBPL CT C $ KENO, MONTE CARLO MULTIGROUP CRITICALITY CODE 450
ORNL  360  F4    RS P     A $ POLLA, CONVERTS R-MATRIX RESONANCE PARAMETERS 639
ORNL  360  F4    RS P     O $ ALPHA-M, RESOLUTION OF GAMMA RAY SPECTRA      413
ORNL  360  F4    RS P     P $ KEELE, LINEARLY-CONSTRAINED OPTIMIZATION      556
ORNL  360  F4    RS P   T A $ ATHENA4, INELASTIC SCATTERING FORM FACTORS    417
ORNL  360  F4    RS P   T B $ RICE, PRIMARY RECOIL ATOM SPECTRA ENDF/B DATA 453
ORNL  360  F4    RS P   T B $ SUPERTOG, ENDF/B FINE-GP CONSTANTS GENERATION 431
ORNL  360  F4    RS P   T C $ EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM 156
ORNL  360  F4    RS P   T H $ HEATING3, 1,2, OR 3-D HEAT CONDUCTION PROGRAM 517
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ORNL   360   F4     RS P    T H $ ORRIBLE, ROD BUNDLE FLOW & TEMPERATURE DIST.      629
ORNL   360   F4     RS P   C  G $ STEFEG, ANALYSIS OF PWR & BWR GASEOUS RELEASE     583
ORNL   360   F4     RS P X T H $ ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION       525
ORNL   360   F4     RS P XCT F $ TASK, 1-D MULTIGROUP REACTOR KINETICS PROGRAM      558
ORNL   360   F4     RS PLX T B $ XSDRN, DISCRETE ORDINATE MULTIGROUP CONSTANTS      393
ORNL   360   F4     RSBP XCT B $ XLACS, XSDRN MULTIGROUP LIBRARIES FROM ENDF/B      572
ORNL   360B  F+BAL  RS P    T B $ RAFFLE, 1ST FLIGHT COLLISION PROBABILITIES MC    392
ORNL   360B  F4     RS P    T D $ ORCOST, POWER PLANT CAPITAL COST ESTIMATING      588
ORNL   360B  F4     RS PL CT M $ EDITOR, ENDF/B TAPE PROCESSING AND EDITING        502
ORNL   360C  F4     RS P XCT D $ CONCEPT3, POWER PLANT CONCEPTUAL COST ESTIMATE    498
ORNL   360H  F4     RS P    T K $ CITATION, 1,2,3-D DIFFUSION DEPLETION MULTIGP    387
ORNL  1604   F2     RS P       H $ BIGDEAL, SPENT YANKEE-FUEL TEMPERATURE CALC     549
ORNL  1604   F63    RS P       A $ PEGGY, ELASTIC SCATTERING PHASE-SHIFT ANALYSIS  334
ORNL  1604   F63    RS P       A $ RAMES, PARTICLE WAVE FUNCTION RADIAL INTEGRALS  335
ORNL  1604   F63    RS P       D $ ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS        180
ORNL  1604   F63    RS P       D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC  322
ORNL  1604   F63    RS P       D $ ISOTOPES, MAXIMUM YIELD FROM REACTION OR DECAY  179
ORNL  1604   F63    RS P       D $ POWERCO, NUCLEAR STATION ELECTRICITY COSTS      34
ORNL  1604   F63    RS P    T A $ JUPITER1, COUPLED-CHANNEL X-SEC EVALUATION       308
ORNL  6600   F4     RS P    T M $ EDITOR, ENDF/B TAPE PROCESSING AND EDITING       502
ORNL  7090   F+FAP  RS P    T C $ EXTERMINATOR, 2-D MULTI-GP DIFFUSION PROGRAM     156
ORNL  7090   F+FAP  RS P    T D $ ASSAULT, 2-D MULTI-GP DIFFUSION DEPLETION CODE   240
ORNL  7090   F2     RS         A $ LYNNE, WOODS-SAXON POTENTIAL SHAPE CALCULATION   381
ORNL  7090   F2     RS P    T C $ EQUIPOISE3, 2-D 2-GROUP DIFFUSION SLAB CYL       39
ORNL  7090   F2     RS P    T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB    87
ORNL  7090   F2     RS P    T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY    32
ORNL  7090   F2     RS P    T C $ ZOGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER   40
ORNL  7090   F2     RSBP       D $ ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS        180
ORNL  7090   F2     RSBP       C $ NUCY, SOLUTION OF NUCLIDE CHAIN EQUATIONS       134
ORNL  7090   F4     RSBP       A $ MUFFLE, FISSILE NUCLIDE X-SECTION EVALUATION    323
ORRIBLE, ROD BUNDLE FLOW & TEMPERATURE DIST.   ORNL  360  F4    RS P   T H $  629
ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION   ORNL  360  F4    RS P X T H $ ORTHIS,  525
ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION   ORNL  360  F4    RS P X T H $  525
OS SYSTEM CATALOG UTILITY ROUTINE ANL   360B BAL   RSB   X T P $ COPYCAT, IBM  646
OS/360 MVT REMOTE JOB ENTRY SYSTEM   ANC   360  BAL   RSB   T P $ NRTS-RJE,   519
OSCILLATION   CEND  360  F4    RS P X T F $ CEXE,INCEXE, 1-GP 3-D XYZ XENON  415
OSUC  370  F4    RS PL CT C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE     29
OSUC  370  F4    RS PLXCT B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC       51
OS360 MVT/MFT PERFORMANCE MONITOR SLAC  360  BAL   RS    CT P $ SLACMON 2.2,  635
OUTPUT PW   1604  LAG1  RS P       N $ DTX, EFFECTIVE X-SECTION CALC FROM DSN  210
OUTPUT DATA LASL 6600  F4    RS P   T B $ GLEN, GROUP CONSTANT CALC FROM TOR   361
OUTPUT FROM MIXED ISOTOPES   MLMO  360  F4    RSBP  CT C $ ISOTAB, PU POWER   619
OUTPUT GGA  1108  F5    RS P   T N $ GAPER2D, 2-D PERTURBATION CALC FROM 2DF  471
OUTPUT TAPE EDIT REACTION RATES   UK-W 7090  F2    RS        N $ WEC, W-CSN   133
OVERLAP AND LATTICE EFFECTS   GGA  7044  F+MAP RS P   T B $ GARCL, RESONANCE  219
OVERLAP AND LATTICE EFFECTS   LER  7094  F+MAP RS P   T B $ GARCL, RESONANCE  219
OXIDE FUEL PERFORMANCE FINITE-ELEMENT GESV  635  F4    RS P  CT I $ BEHAVE2,  568
OXIDE FUEL ROD STRESS & DEFORMATION   BAPL 6600  F4    RS P   T I $ CYGRO3,   449
OXIDE FUEL ROD STRESS & DEFORMATION   TVA  360  F4    RS P   T I $ CYGRO3,   449
PACTOLUS,CLOTHO, NUCLEAR POWER PLANT COST CODE HEDL 1108  F5    RS P X T D $  540
PARALLEL BEAMS   ANL  3600  F36   SBP     I $ BOW2, DEFLECTION CALCULATION   365
PARET, WATER-COOLED CORE TRANSIENT ANALYSIS   ANC  360  F+BAL RSBPL CT G $   555
PARTI, OPTIMAL GROUP OR MESH COLLAPSING   TRW  6500  F4    RS P      B $    416
PARTIAL REFUEL   GGA  7044  F4    RS P   T D $ GARGOYLE, FUEL CYCLE ANALYSIS  260
PARTICLE TRANSPORT STUDY   RFD  3600  F36   RS P     G $ DISPER, AEROSOL     554
PARTICLE TRANSPORT XY RZ RTH LASL 7600  F4    RS P   T C $ TWOTRAN-PNVW, 2-D  573
PARTICLE WAVE FUNCTION RADIAL INTEGRALS ORNL 1604  F63   RS P     A $ RAMES,  335
PARTICLES SAMPLING STUDY   BAPL 6600  F4    RS P   T C $ BETTY, ENTRAINED   545
PATTERN INDEXING LASL 6600  F+COM RS P   T Q $ INDX, XRAY DIFFRACTION POWDER 609
PAX03, HARMONY-PDQ X-SECTION GENERATION CODE   BAPL 6600  F+COM RS P X T B $ 426
PDP-11 ON 360 ANC   360  PL1   RS P   T P $ PTAC11, 2-PASS ASSEMBLER FOR THE  516
PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION   IBM   360A F+BAL RS P   T D $  336
PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION   MIT   360B F+BAL RSBP   T D $  336
PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION   ANC   360F F+BAL RS P XCT D $  275
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PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION BAPL 6600A F+ASC RS P T D $ 275
PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION BAPL 6600C F+ASC RS P T D $ 275
PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION BCS 6600D F+ASC R B T D $ 275
PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION BW 6600B F+ASC RS P T D $ 275
PEGGY, ELASTIC SCATTERING PHASE-SHIFT ANALYSIS ORNL 1604 F63 RS P A $ 334
PELEN, FUEL PELLET TEMPERATURE & DEFORMATION BAPL 6600 F4 RS P T I $ 598
PELLET CRACKING BAPL 6600 F4 RS P I $ STRIPE, FUEL ROD CLAD STRAIN & 570
PELLET TEMPERATURE & DEFORMATION BAPL 6600 F4 RS P T I $ PELEN, FUEL 598
PENETRATION CALCULATION DAC 7090 F2 RSBP J $ LIPRECAN1, MC NEUTRON 123
PENETRATION STUDY LASL 7090 FLCCC RS P B $ MCS, MONTE CARLO NEUTRON 202
PERFORMANCE AND PRICE STUDY GGA 7044 F+MAP RS P T D $ OPUS, POWER PLANT 226
PERFORMANCE DATA ANL 360 F4 RS P D $ NPRFCCP, FUEL CYCLE COSTS 146
PERFORMANCE DATA UEC 6600 F4 RS P D $ NPRFCCP, FUEL CYCLE COSTS 146
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PERFORMANCE MONITOR SLAC 360 F+BAL RS CT P $ PROGLOCK, USER PROGRAM 642
PERFORMANCE MONITOR SLAC 360 BAL RS CT P $ SLACMON 2.2, OS360 MVT/MFT 635
PERFORMANCE STUDY GGA 7044 F4 RS P D $ WAMPUM, FUEL CYCLE COSTS 224
PERFORMANCE STUDY UEC 6600 F4 RS P D $ WAMPUM, FUEL CYCLE COSTS 224
PERT, 1-D PERTURBATION FOR AIM AND FOG CODES AI 7090 F2 RS C $ 30
PERT, 1-D PERTURBATION FOR AIM AND FOG CODES BHSC 360 F4 RS P C $ 30
PERT, 1-D PERTURBATION FOR AIM AND FOG CODES CDC 1604 F63 RS C $ 30
PERTURBATION CALC FROM 2DF OUTPUT GGA 1108 F5 RS P T N $ GAPER2D, 2-D 471
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PERTURBATION FOR AIM AND FOG CODES BHSC 360 F4 RS P C $ PERT, 1-D 30
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PHASE SHIFT X-SEC & POLARIZATION CALC KAPL 6600 F4 RS P T A $ PHASER, 507
PHASE-SHIFT ANALYSIS ORNL 1604 F63 RS P A $ PEGGY, ELASTIC SCATTERING 334
PHASER, PHASE SHIFT X-SEC & POLARIZATION CALC KAPL 6600 F4 RS P T A $ 507
PHENIX, 2D DIFFUSION BURNUP REFUELING HISTORY LASL 6600 F4 RS P T D $ 454
PHOTOFRACTION SOLID CRYSTAL MTS 7090 MAD RSB C $ BURP4, GAMMA-RAY 169
PHOTOFRACTION WELL CRYSTAL MTS 7090 MAD RSB D $ BURP5, GAMMA-RAY 170
PHOTOMULTIPLIER ELECTRON DISTRIBUTION ANL 360 F4 RS P C $ DYNO1, 464
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PHROG, MULTI-GP CONSTANT & FAST SPECTRA CALC ANC 360 F4 RS PLXCT B $ 520
PHYSICS MODULES DP 360 F+BAL S X T B $ RAHAB, JOSHUA SYSTEM LATTICE 536
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PLANNING MLMC 360 F+C+R RSBP T M $ RALCRTPH, RESOURCE ALLOCATION PROJECT 603
PLANT CAPITAL COST ESTIMATING ORNL 3608 F4 RS P T D $ ORCOST, POWER 588
PLANT CONCEPTUAL COST ESTIMATE ORNL 3600 F4 RS P XCT D $ CONCEPT3, POWER 498
PLANT COST CODE HFDL 1108 F5 RS P X T D $ PACTOLUS,CLOTHO, NUCLEAR POWER 540
PLANT DESIGN OPTIMIZATION AI 7090 F2 RS I $ OPCCK, SPACE POWER 112
PLANT DESIGN OPTIMIZATION AI 7090 F2 RS I $ SHCCK, SPACE POWER 114
PLANT PERFORMANCE AND PRICE STUDY GGA 7044 F+MAP RS P T D $ OPUS, POWER 226

PLANT RADIATION RELEASE & DOSE PGE 360 F4 RS P CT G $ EMERALD, PWR 546
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PLENUM, FLOW DIST. IN CYL COOLANT INLET PLENUM DP 360 F4 RS P H $ 586
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PLOTS & AREA CALCULATION SLA 6600 F4 RS P P $ PLOTR, 2D CONTOUR 578
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POINT-KERNEL SHIELD EVALUATION CODE BAPL 6600B F+ASC RS P T J $ SPAN4, A 462
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POWER AND FLOW TRANSIENTS ANL 6600 F4 RS P T F $ SAS1A, FAST REACTOR 400
POWER DIST SEARCH GGA 7044 F4 RS P T C $ GASP2, 1-D FEW-GP DIFFUSION 220
POWER DISTRIBUTION CDC 3600 F63 RSBP T C $ FLARE, 3-D REACTIVITY AND 167
POWER DISTRIBUTION MSS 360 F4 RS P CT C $ FLARE, 3-D REACTIVITY AND 167
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POWER EXCURSION DISASSEMBLY ANL 360 F4 RS P XCT F $ VENUS, 2-D LMFBR 511
POWER MCGUIRE UNITS DUCO 635 F4 RS G $ ANVENT, LOCA ANALYSIS DUKE 529
POWER OUTPUT FROM MIXED ISOTOPES MLMO 360 F4 RSBP CT Q $ ISCTAB, PU 619
POWER PLANT CAPITAL COST ESTIMATING ORNL 360B F4 RS P T D $ ORCOST, 588
POWER PLANT CONCEPTUAL COST ESTIMATE ORNL 3600 F4 RS P XCT D $ CONCEPT3, 498
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PPCO 7040 F+MAP RS P A $ COMBCO, COMBINED B-W MULTI-LEVEL CONVOLUTION 203
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PPCO 7044 F+MAP RS P T H $ TOODEE, 2-D TIME-DEPENDENT HEAT CONDUCTION 349
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PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES  ANC  1108  F4    RS P   T G $      528
PREPARATION      GGA  1108  F4    RS P X T L $ GAND, GAFGAR X-SECTION LIBRARY     345
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PROCESSOR         LASL 6600  F4    RS P      L $ GENRD, FREE-FORMAT CARD INPUT    530
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PSEUDO, STATISTICAL RESONANCE PARAMETER CALC   GGA  1108  F4    RS P     A $      292
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PURCHASE VERSUS LEASE ANALYSIS   SLA  1108  COBOL RS P     M $ BECOM, AEC DP      589
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QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE					ANL	3600	36F	RS PL CT F $	474
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RALCRTPH, RESOURCE ALLOCATION PROJECT PLANNING					MLMO	360	F+C+R	RSBP T M $	603
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RAMP1, REICH-MOORE RESOLVED REGION X-SECTIONS					BNL	6600	F4	RS P A $	492
RAPFU, FUEL CYCLE PARAMETERS FAST BREEDERS					NED	635	F4	RS P D $	372
RAPP, HIGH-VELOCITY FLOW STUDY STEAM-WATER MIX					KAPL	6600	F4	RS P H $	382
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RESOURCE ALLOCATION PROJECT PLANNING MLMO  360  F+C+R RSBP   T M $ RALCRTPH,   603
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RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG CELL  ANL  3600  F36    RSBP X T B $   213
RIGEL, ENDF/B V3 DATA PROCESSING CODE          ANL   360  F4     RS     T M $   571
RIGEL,PLOTFB,... ENDF/B V2 PROC  BNL  6600B F4     RS     T M $ CRECT,CHECKER,   475
RIGEL3, ENDF/B V3 PROCESSING CODES      BNL  6600  F4     RS     T M $ CHECK3,  571
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ROD CLAD STRAIN & PELLET CRACKING BAPL 6600  F4     RS P     I $ STRIPE, FUEL   570
ROD STRESS & DEFORMATION    BAPL 6600  F4     RS P   T I $ CYGRO3, OXIDE FUEL  449
ROD STRESS & DEFORMATION    TVA   360  F4     RS P   T I $ CYGRO3, OXIDE FUEL  449
ROD THERMAL RESPONSE LOCA        ANC   360  F4     RSBP X T G $ THETA1-B, FUEL  512
ROOTS OF A POLYNOMIAL            KAPL 6600  F4     RS P     P $ ROPE, FINDING   444
ROPE, FINDING ROOTS OF A POLYNOMIAL            KAPL 6600  F4     RS P     P $   444
RSAC, RADIOLOGICAL SAFETY ANALYSIS PROGRAM     ANC   360  F4     RSBP  CT G $   265
RTH   WANL 7094  F4     RS P X T C $ VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ  264
RTH LASL 7600  F4     RS P   T C $ TWOTRAN-PNVW, 2-D PARTICLE TRANSPORT XY RZ 573
RTHETA  LASL  3600 F4     RSBP  CT C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ  358
RTHETA  LASL 6600 F4     RS P   T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ  358
RTHETA  LASL 7600 F4     RS P   T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ  358
RTHETA GEOMETRY  BNW  1108  F4     RS P     C $ PERT4, 2-D PERTURBATION XY RZ 304
RUPTURE GGA  7044  F4     RS    X T G $ PRECON, HTGR CONTAINMENT PRESSURE POST 228
RZ  PW   1604  F63    RS P   T C $ FORTRAN TOC, 2-D MULTI-GP SN APPROXIMATION 161
RZ GEOMETRY   GGA  7090  F+FAP RSBP   T D $ DDB, 2-D FEW-GP DIFFUSION BURNUP   99
RZ GEOMETRY  LLI   709  F2     RS     C $ FIRN, 2-D FEW-GP S4 APPROXIMATION     7
RZ GEOMETRY GGA  1108  F+BAL RS P   T C $ GAMBLE5, 2-D MULTI-GP DIFFUSION XY   222
RZ GEOMETRY GGA  7044  F+MAP RSBP   T C $ GAMBLE4, 2-D MULTI-GP DIFFUSION XY   222
RZ GGA  1108  F+BAL RS P   T D $ BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP XY,   438
RZ RTH   WANL 7094  F4     RS P X T C $ VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY  264
RZ RTH LASL 7600  F4     RS P   T C $ TWOTRAN-PNVW, 2-D PARTICLE TRANSPORT XY 573
RZ RTHETA  LASL  3600 F4     RSBP  CT C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY  358
RZ RTHETA  LASL 6600 F4     RS P   T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY  358
RZ RTHETA  LASL 7600 F4     RS P   T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY  358
RZ RTHETA GEOMETRY  BNW  1108  F4     RS P     C $ PERT4, 2-D PERTURBATION XY 304
R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS   ANL   360  F4     RS P     E $   255
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R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS   ANL  3600  F63   RSBP     E $    255
R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS   WANL 7094  F4    RS P     E $    255
R102, SPACE-INDEPENDENT INVERSE KINETICS CALC  ANL   360  F4    RS P     E $    168
R102, SPACE-INDEPENDENT INVERSE KINETICS CALC  ANL  3600  F63   RSBP     E $    168
R102, SPACE-INDEPENDENT INVERSE KINETICS CALC  WANL 7094  F4    RS       E $    168
R153, PARAMETRIC SITE REQUIREMENT STUDY        ANL  3600  F63   RSBP   T G $    172
S-WAVE NEUTRON X-SECTION CALCULATION    BAPL 6600  F4    RS P   T A $ SUMOR,    399
SABOR4, DISCRETE-ELEMENT ANALYSIS THIN SHELLS  MIT   360  F4    RS P   T I $    402
SAFE PROGRAMS       GGA  1108  F4    RS P     L $ GRDWRK, GRID GENERATION FOR   296
SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC LOAD GGA  7044  F4    RS P   T I $    251
SAFE-CRACK, VISCOELASTIC ANALYSIS OF CONCRETE  GGA  1108  F5    RS P   T I $    451
SAFE-CREEP, VISCOELASTIC ANALYSIS CONCRETE     GGA  1108  F4    RS P     I $    300
SAFE-PORS, STRESS ANALYSIS AXISYMMETRIC LOAD   GGA  7044  F4    RSBP  CT I $    250
SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES  BNL  6600  F4    RS P   T I $    252
SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES  GGA  1108  F4    RS P     I $    252
SAFE-SHELL, STRESS ANALYSIS THIN SHELLS        GGA  1108  F4    RS P     I $    253
SAFE-2D, PLANE & AXISYMMETRIC STRESS ANALYSIS  GGA  1108  F4    RS P     I $    379
SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY  GGA  1108  F4    RS P   T I $    332
SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY  CRNL  360  F+BAL RS P   T I $    332
SAFETY     DP    360  F4    RS P   T C $ KEFF,MGBS,TGAN, NUCLEAR CRITICALITY    617
SAFETY ANALYSIS PROGRAM     ANC   360  F4    RSBP  CT G $ RSAC, RADIOLOGICAL    265
SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY  AI   7090  F2    RS P     B $     52
SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY  CDC  1604  F63   RS P     B $     52
SAMPLE STATISTICS  BKC   360  F4    RSBP     P $ HISTOGRAMS, QUALITY CONTROL   614
SAMPLING STUDY      BAPL 6600  F4    RS P   T O $ BETTY, ENTRAINED PARTICLES    545
SAP4, STRUCTURAL ANALYSIS OF LINEAR SYSTEMS    ANL   3608 F4    RS P  CT I $    641
SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS  ANL   360  F4    RS P   T F $    400
SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS  ANL  6600  F4    RS P   T F $    400
SATURATED BLOWDOWN2, BLOWDOWN ANALYSIS LOFT    KE   7094  F+MAP RSBP   T G $    200
SCARF2, SCATTER FROM RADIATOR FINS SNAP GEOM   AI   7090  F2    RS       J $    110
SCAR1, SCATTER FROM A RING SNAP GEOMETRY       AI   7090  F2    RS       J $    111
SCAT KERNELS      DP    360  BCD   R   LX T Z $ THERMOS LIBRARY, 30-GP ENDF/B    543
SCAT RESONANCES AI     360  F4    RS PLX T B $ AILMOE, X-SECTION CALC ELASTIC    147
SCAT RESONANCES AI   7094  F+FAP RS PL  T B $ AILMOE, X-SECTION CALC ELASTIC    147
SCAT X-SEC   BNL  6600  F4    RS P     A $ BESFIT, DIFFRACTION MODEL ELASTIC    524
SCAT X-SECTION CALC MODERATOR GGA  1108  F4    RS P     A $ GAKER, INELASTIC     289
SCAT X-SECTIONS HEX LATTICE   GGA  1108  F4    RS       B $ HEXSCAT, ELASTIC     291
SCATTER FROM A RING SNAP GEOMETRY       AI   7090  F2    RS       J $ SCAR1,       111
SCATTER FROM RADIATOR FINS SNAP GEOM   AI   7090  F2    RS       J $ SCARF2,      110
SCATTERING  CDC  1604  F63   RS P     A $ HAFEVER, HAUSER-FESHBACH INELASTIC     14
SCATTERING CALC   ANL   360  F4    RS P  CT W $ MSCAT, SLOW NEUTRON MULTIPLE    575
SCATTERING CRYSTALLINE MATERIALS  LASL 6600  F4    RS P   T A $ TOR, THERMAL    360
SCATTERING DATA  DP    3608 F4    RS P XCT A $ FLANGE2(71-1), ENDF/B THERMAL    368
SCATTERING FORM FACTORS     CRNL  360  F4    RS P   T A $ ATHENA4, INELASTIC    417
SCATTERING KERNEL CALC      GGA  7090  F2    RS     T A $ SUMMIT, CRYSTALLINE    56
SCATTERING LAW CALC  GGA  1108  F4    RS P X   A $ COHBE, COHERENT INELASTIC    385
SCATTERING LAW CALCULATION     GGA  1108  F4    RS P     A $ GASKET, THERMAL    263
SCATTERING LAW X-SECTION CALCULATION  GGA  1108  F5    RS P     A $ FLANGE1,     247
SCATTERING PHASE-SHIFT ANALYSIS CRNL 1604  F63   RS P     A $ PEGGY, ELASTIC     334
SCATTERING X-SEC CALC   KAPL 6600  F4    RS P   T A $ JP1XR, COUPLED-CHANNEL    506
SCATTRING CODES ANC   360  F4    RS P  CT W $ MACS LATTICE VIBRATION NEUTRON    574
SCHEME   KAPL 6600  F4    RS P     P $ MOST, A MULTIDIMENSIONAL OPTIMIZATION    446
SCISRS ENDF/B GRAPHIC X-SEC EVALUATION AI    360  F+BAL RSB L CT M $ SCORE3,     375
SCISRS X-SECTION TAPE   GGA  7044  F+MAP RSBP     M $ UNPACK, RETRIEVAL FROM     206
SCISRS X-SECTION TAPES  WANL 7094  F+FAP RSBPL  T N $ CPS, SC4020 PLOTS FROM     239
SCOPE2.0 CEND 7600B F4    RS       T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB   478
SCOPE3.2 CDC  6600C F+COM RS       T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB   478
SCOPE3.3 CDC  6600D F+COM RS       T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB   478
SCORE3, SCISRS ENDF/B GRAPHIC X-SEC EVALUATION AI    360  F+BAL RSB L CT M $ 375
SC4020 PLOTS FROM SCISRS X-SECTION TAPES  WANL 7094  F+FAP RSBPL  T N $ CPS,     239
SC4020 PLOTS FROM X-SECTION TAPES   GGA  7044  F+SPS RSBP   T N $ CROSSPLOT,     207
SEAL SHELL, SHELL STRESS ANALYSIS AXISYM LOAD  WTSC 6600B F4    RS P   T I $    282
SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD  BAPL 6600  F4    RS P   T I $    282
SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD  SR    360  F4    RS P   T I $    282
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SEARCH    GGA  1108  F4    RS P    T C $ GASP7, 1-D PURNUF POWER DISTRIBUTION    319
SEARCH  GGA  7044  F4    RS P    T C $ GASP2, 1-D FEW-GP DIFFUSION POWER DIST   220
SEARCH & RETRIEVAL   SLA  1108  F+BAL RSBP    T M $ SPIRAL, FULL-TEXT STORAGE,   607
SECTIONS   LASL 6600  F4    RS P      N $ LARCA, FLUX-WEIGHTING OF DTF4 CROSS   409
SELF-ORGANIZING MESH GENERATION   SLA  6600  F4    RS P    T L $ QMESH,RENUM,    612
SEMI-RIGID MOLECULES ANC   360  F4    RS P      W $ MMM3, COORDINATE ANALYSES   632
SENSITIVITY            ANL   360  F4    RSBPL CT C $ VARI-1D, 1-D VARIATIONAL   625
SERVICE ROUTINES   ANL  3600  36F   RSBP    T M $ MERMC2,MAGIC, MC**2 LIBRARY   472
SERVICE ROUTINES ENDF TAPES    BNL   7090  F+FAP RS P    T M $ DFSR, DATA FILE   236
SETS   GESV H600  F4    RS P  CT C $ TRIAL, 3-D REACTION RATES FROM 2-D FLUX   585
SETS   LASL 6600  BCD   R   LX T Z $ LASL XSEC SETS, SN 18- 24- AND 25-GROUP   532
SETS, SET EQUATION TRANSFORMATION SYSTEM        SLA  6600F FTN   RS P   T P $   623
SETS, SN 18- 24- AND 25-GROUP SETS   LASL 6600  BCD   R   LX T Z $ LASL XSEC   532
SHAPE CALCULATION CRNL 7090  F2    RS        A $ LYNNE, WCCDS-SAXON POTENTIAL   381
SHEET DP PACKAGE   KAPL 6600  F+ASC RS P    T P $ DOGGY, DESK CALCULATOR FORM   428
SHELL BUCKLING COLLAPSE ANALYSIS    BAPL 6600  F4    RS P    T I $ BUSHL, CYL   481
SHELL STRESS ANALYSIS AXISYM LOAD   BAPL 6600  F4    RS P    T I $ SEALSHELL2,  282
SHELL STRESS ANALYSIS AXISYM LOAD   SR    360  F4    RS P    T I $ SEALSHELL2,  282
SHELL STRESS ANALYSIS AXISYM LOAD   WTSC 6600B F4    RS P    T I $ SEAL SHELL,  282
SHELL 3-D STRUCTURAL ANALYSIS       GGA  1108  F5    RS P    T I $ SHELL5, THIN  452
SHELL, SHELL STRESS ANALYSIS AXISYM LOAD   WTSC 6600B F4    RS P    T I $ SEAL  282
SHELLS          GGA  1108  F4    RS P      I $ SAFE-SHELL, STRESS ANALYSIS THIN  253
SHELLS          SLA  6600  F4    RS P    T I $ SLADE-D, DYNAMIC ANALYSIS OF THIN  581
SHELLS  MIT   360  F4    RS P    T I $ SABCR4, DISCRETE-ELEMENT ANALYSIS THIN  402
SHELLS OF REVOLUTION      KAPL 6600C F4    RS P    T I $ SCR3, STRESS ANALYSIS   80
SHELL5, THIN SHELL 3-D STRUCTURAL ANALYSIS       GGA  1108  F5    RS P    T I $  452
SHIELD DESIGN MULTIGROUP SLAB GEOMETRY    ANL  3600  F63   RSBPL  T J $ MAC,   143
SHIELD DESIGN MULTIGROUP SLAB GEOMETRY    BNW  7090  F2    RSBPL  T J $ MAC,   143
SHIELD EVALUATION CODE   BAPL 6600B F+ASC RS P    T J $ SPAN4, A POINT-KERNEL  462
SHIELD LEAKAGE    AI   7090  F2    RS        J $ FARSE1A, DOSE RATE FROM SNAP   91
SHIELD WEIGHT OPTIMIZATION DOSE CALC      AI   7094  F+FAP RS P      J $ SHOE,  197
SHIELDING CODE CAVITY GEOM GGA  1108  F4    RS P    T J $ MUSCAT, VIEW FACTOR  259
SHIFT X-SEC & POLARIZATION CALC  KAPL 6600  F4    RS P    T A $ PHASER, PHASE  507
SHLOG, DATA MANAGEMENT, EDITING, & ANALYSIS    BAPL 6600  F4    RS P    T M $  557
SHOCK, SPACE POWER PLANT DESIGN OPTIMIZATION    AI   7090  F2    RS        I $  114
SHOE, SHIELD WEIGHT OPTIMIZATION DOSE CALC      AI   7094  F+FAP RS P      J $  197
SIGPLOT, RESOLVED MULTILEVEL B-W X-SEC CALC     BNL  6600  F4    RS P      A $  377
SIMPLE1, TIME-SHARING PROGRAMMING LANGUAGE      KAPL 6600  F+ASC RS        P $  442
SIMULATION    BAPL 6600  F4    RS P    T G $ FLASH4, FULLY-IMPLICIT TRANSIENT  448
SIMULATION    MA-C  360  F4    RSBP  CT G $ FLASH4, FULLY-IMPLICIT TRANSIENT  448
SIMULATION  BAPL 6600  F4    RS P    T I $ BUBL1, FUEL SWELLING & GAS RELEASE  468
SIMULATION OF REACTOR DYNAMICS          AI    360  F+BAL RS P    T E $ AIROS2A,  326
SIMULATION OF REACTOR OPN DP    360  F4    RS P      G $ INTEG,INSPEC, MARKOV  590
SINGLE FAILURE MODE   BAPL 6600  F4    RS P      P $ RELO1, RELIABILITY FOR A  497
SINGLE SOURCE  ANL  GETS  F   R         P $ PLETHS, ISOPLETH-AREA CALC FROM  591
SINGLE-CHANNEL SPACE-TIME SYNTHESIS    KAPL 6600  F4    RS P      F $ STINT3,  389
SINGULARITY MODELING    SLA  6600  FTN   RS P    T I $ CHILES, LINEAR ELASTIC  611
SITE REQUIREMENT STUDY          ANL  3600  F63   RSBP   T G $ R153, PARAMETRIC  172
SITE REQUIREMENT STUDY      AI    360  F4    RS P    T G $ AISITE2, PARAMETRIC  172
SITE REQUIREMENT STUDY      AI   7094  F+FAP RS P    T G $ AISITE2, PARAMETRIC  172
SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION      AI    360  F4    RSBP X T D $   58
SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION      AI   7090  F2    RS  L  T D $   58
SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION      CDC  1604  F63   RS  L  T D $   58
SLA   360  COBOL RSBP  CT M $ BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS   589
SLA   360  F4    RS P X T P $ DE/STEP,INTRP, SCLN OF ORDINARY DIFF EQUATIONS  640
SLA  1108  COBOL RS P      M $ BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS  589
SLA  1108  F+BAL RSBP   T M $ SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL  607
SLA  360C  F36   RS P   T S $ TOCDY2, 2-D LAGRANGIAN EQNS OF MOTION SOLUTION  627
SLA  6600  FTN   RS P   T I $ CHILES, LINEAR ELASTIC SINGULARITY MODELING  611
SLA  6600  F4    RS P      P $ ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION  601
SLA  66CC  F4    RS P      P $ PLCTR, 2D CONTOUR PLOTS & AREA CALCULATION  578
SLA  6600  F4    RS P      V $ FFEARS, LAPLACE EQUATION ISOTROPIC DIELECTRICS  577
SLA  6600  F4    RS P   T I $ SLADE-D, DYNAMIC ANALYSIS OF THIN SHELLS  581
SLA  6600  F4    RS P   T L $ QMESH,RENUM, SELF-ORGANIZING MESH GENERATION  612
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SLA  6600  F4    RS P X T P $ DE/STEP,INTRP, SCLN CF CRDINARY DIFF EQUATIONS    640
SLA  660CB FTN   RS P   T P $ SETS, SET EQUATICN TRANSFORMATION SYSTEM          623
SLAB  CDC  1604  F63   RS P   T C $ EQUIPOISE3A, 2-D 2-GP CIFFUSICN CYLINDER    87
SLAB  ORNL 7090  F2    RS P   T C $ EQUIPOISE3A, 2-D 2-GP CIFFUSICN CYLINDER    87
SLAB AND SPHERE GECM SN TRANSPORT    ANL  3600  F36   RS P XCT C $ TESS, 1-D   513
SLAB CYL     ORNL 7090  F2    RS P   T C $ EQUIPOISE3, 2-D 2-GROUP DIFFUSION    39
SLAB CYL SPHERE    BNW  1107  F4    RS P   T C $ HFN, 1-D MULTI-GP DIFFUSION   241
SLAB CYL SPHERE   AI   7090  F+FAP RS  L  T C $ FAIM, 1-D MULTI-GP DIFFUSION   120
SLAB CYL SPHERE   AI   7090  F+FAP RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION    29
SLAB CYL SPHERE   CDC  1604  F63   RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION    29
SLAB CYL SPHERE   CDC  1604  F63   RS PLX T C $ FAIM, 1-D MULTI-GP DIFFUSION   120
SLAB CYL SPHERE   CSUC  370  F4    RS PL CT C $ AIM6, 1-D MULTI-GP DIFFUSION    29
SLAB CYL SPHERE  AI   7090  F+FAP RS  L  T C $ ULCER, 1-D MULTI-GP DIFFUSION   118
SLAB CYL SPHERE  ANL  3600  F36   RS P X T C $ MACH1, 1-D MULTI-GP DIFFUSION   262
SLAB CYL SPHERE  MTS   360  F4    RSBPLXCT C $ MACH1, 1-D MULTI-GP DIFFUSION   262
SLAB CYL SPHERE  PURD 6500  F4    RS PLX T C $ MACH1, 1-D MULTI-GP DIFFUSION   262
SLAB CYL SPHERE  PW   1604  LAG1  RS P     C $ MGDSN, 1-D MULTI-GP SN APPROX   211
SLAB CYL SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN, 1-D MULTI-GP SN APPROX   132
SLAB CYL SPHERE BHSC  360  F4    RS P   T C $ FAIMCS, 1-D MULTI-GP DIFFUSION   120
SLAB CYLINDER CDC  1604  F63   RS P   T C $ 2DGRAND, 2-D FEW-GRCUP DIFFUSICN    40
SLAB CYLINDER ORNL 7090  F2    RS P   T C $ 2DGRAND, 2-D FEW-GRCUP DIFFUSICN    40
SLAB CYLINDER SPHERE  AFB   360  F4    RS  L  T C $ FIRE5, 1-D AGE-DIFFUSICN     9
SLAB CYLINDER SPHERE AI   7090  F2    RS P   T C $ FOG, 1-C FEW-GP DIFFUSION    28
SLAB CYLINDER SPHERE BC    625  F4    RS P   T C $ FOG, 1-C FEW-GP DIFFUSION    28
SLAB CYLINDER SPHERE CDC  1604  F63   RS P   T C $ FOG, 1-C FEW-GP DIFFUSICN    28
SLAB GAMMA-RAY TRANSPORT        BAPL 6600  F4    RS P   T J $ M0756,LETO, 1-D   343
SLAB GECM PPCC 7090  F2    RS P     C $ MIST, 1-D FEW-GP SN DOUBLE SN APPROX    59
SLAB GECMETRY    AI   7090  F2    RS P     J $ GRACE1, GAMMA-RAY ATTENUATICN    45
SLAB GECMETRY    ANL  3600  F63   RSBPL  T J $ MAC, SHIELD DESIGN MULTIGRCUP   143
SLAB GECMETRY    BNW  7090  F2    RSBPL  T J $ MAC, SHIELD DESIGN MULTIGRCUP   143
SLAB GECMETRY    CDC  1604  F63   RS P     J $ GRACE1, GAMMA-RAY ATTENUATICN    45
SLAB GECMETRY  AI   7090  F2    RS P     B $ SAIL, 1-D 1-GP SN APPROXIMATICN    52
SLAB GECMETRY  BAPL 6600  F4    RS P   T C $ BE21, FEW-GF DISCRETE ORDINATES   398
SLAB GEOMETRY  CDC  1604  F63   RS P     B $ SAIL, 1-D 1-GF SN APPROXIMATICN    52
SLAB TRANSPORT WITH SLOWING DOWN    BAPL 6600  F4    RS     T C $ M0648, 1-D   342
SLAB, CYL, SPH  ANC   360  F4    RSBP  CT C $ MONA, 1-D MULTIGRCUP DIFFUSICN   582
SLAB, SPH, CYL GGA  1108  F+BAL RS P   T C $ GAZE2, 1-D MULTIGRCUP DIFFUSICN   430
SLAC  360  BAL   RS    CT P $ SLACMCN 2.2, CS360 MVT/MFT PERFCRMANCE MCNITCR   635
SLAC  360  F+BAL RS    CT P $ PRCGLCOK, USER PRCGRAM PERFCRMANCE MCNITCR       642
SLACMON 2.2, OS360 MVT/MFT PERFCRMANCE MONITOR SLAC  360  BAL   RS    CT P $   635
SLADE-D, DYNAMIC ANALYSIS CF THIN SHELLS        SLA  6600  F4    RS P   T I $   581
SLL  6600  F4    RS P     N $ HEATMESH, GECMETRICAL DATA HEAT TRANSFER STUDY   434
SLOW NEUTRON MULTIPLE SCATTERING CALC    ANL   360  F4    RS P  CT W $ MSCAT,   575
SLOWING DOWN     BAPL 6600  F4    RS     T C $ M0648, 1-D SLAB TRANSPCRT WITH  342
SLOWING-DOWN CENSITY CALC  AI   7094  F+FAP RS PL  T B $ TYCHE3, MCNTE CARLC   149
SLOWING-DOWN NPGS  360  F4    RS P X T E $ MCD5, STCCHASTIC MODEL CF NEUTRCN   491
SLOWING-DOWN SPECTRUM, MULTIGP CCNSTANTS BNW  1108  F4    RS PLX T B $ HRG3,   467
SLOWING-DOWN SPECTRUM, MULTICP CCNSTANTS TVA   360  F4    RS PLX T B $ HRG3,   467
SN APPROX     BNW  7090  FLECCO RSBP   T C $ GE-HAPC-S13, 1-D MULTI-GP DOUBLE   75
SN APPROX SLAB CYL SPHERE  PW   1604  LAG1  RS P     C $ MGDSN, 1-D MULTI-GP   211
SN APPROX SLAB CYL SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN, 1-D MULTI-GP   132
SN APPROX SLAB GECM PPCC 7090  F2    RS P     C $ MIST, 1-D FEW-GP SN DOUBLE    59
SN APPROXIMATION CYLINDER     PPCC 7040  F4    RS P   T C $ TOPIC, 1-C FEW-GP   148
SN APPROXIMATION CYLINDER     PPCC 7090  F2    RS P   T C $ TOPIC, 1-D FEW-GP   148
SN APPROXIMATION RZ  PW   1604  F63   RS P   T C $ FORTRAN TDC, 2-D MULTI-GP   161
SN APPROXIMATION SLAB GEOMETRY  AI   7090  F2    RS P     B $ SAIL, 1-D 1-GP    52
SN APPROXIMATION SLAB GEOMETRY  CDC  1604  F63   RS P     B $ SAIL, 1-D 1-GP    52
SN APPROXIMATION XY GECM    AGC  7090  FLECC RSBP     C $ 2DXY, 2-D MULTI-GP    18
SN CONSTANTS FOR DSN TDC    PW   1604  F63   RS P     L $ SNC, CALCULATICN CF   189
SN DOUBLE SN APPROX SLAB GECM PPCC 7090  F2    RS P     C $ MIST, 1-D FEW-GP     59
SN PERTURBATICN CCDE USING DTF4 FLUXES   LASL 6600  F4    RS P     N $ DAC1,    455
SN THECRY   NED   635  F4    RS P   T C $ DDT2CB, 2-D MULTIGRCUP DIFFUSICN &   459
SN TRANSPCRT    ANL  3600  F36   RS P XCT C $ TESS, 1-D SLAB AND SPHERE GECM   513
SN X-SECTION LIBRARY TAPE PREPARATICN    PW   1604  F63   RS       L $ CSP1,   194
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SN X-SECTION LIBRARY TAPE PREPARATION   PW   1604  F63   RS        L $ CSP2A,     193
SN 18- 24- AND 25-GROUP SETS   LASL 6600  BCD   R   LX T Z $ LASL XSEC SETS,     532
SNAP GEOM   AI   7090  F2    RS        J $ SCARF2, SCATTER FROM RADIATOR FINS   110
SNAP GEOMETRY        AI   7090  F2    RS        J $ SCAR1, SCATTER FROM A RING   111
SNAP GEOMETRY    AI   7090  F2    RS P      J $ RATRAP, DOSE RATE CALCULATION    141
SNAP GEOMETRY   AI   7090  F2    RS        E $ SNAPKIN5/5A, 1-REGION KINETICS   122
SNAP GEOMETRY  AI   7090  F2    RS        J $ MORTIMER, DOSE RATE CALCULATION   142
SNAP SHIELD LEAKAGE    AI   7090  F2    RS        J $ FARSE1A, DOSE RATE FROM    91
SNAPKIN5/5A, 1-REGION KINETICS SNAP GEOMETRY   AI   7090  F2    RS        E $   122
SNARG-1D, 1-D MULTI-GP DISCRETE ORDINATE CALC  ANL   3600  F36   RS P    T C $   288
SNC, CALCULATION OF SN CONSTANTS FOR DSN TOC   PW   1604  F63   RS P      L $   189
SNEC, NONLINEAR ALGEBRAIC EQN SOLN CURVE PLOT  KAPL 6600  F+ASC RS P    T P $   364
SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS      ANL   360  F4    RS P      G $   521
SOCOOL2, SODIUM-FUEL INTERACTION ANALYSIS      HEDL 1108  F4    RS P      G $   521
SODIUM POOL FIRE 1- & 2-CELL ANALYSIS AI    360  F4    RS F    T C $ SOFIRE2,   559
SODIUM-FUEL INTERACTION ANALYSIS      ANL   360  F4    RS P      G $ SOCOOL2,   521
SODIUM-FUEL INTERACTION ANALYSIS      HEDL 1108  F4    RS P      G $ SOCOOL2,   521
SODIUM-WATER REACTION   CEND 7600  F4    RS P    T G $ CEHUG, STEAM GENERATOR   548
SOFIRE2, SODIUM POOL FIRE 1- & 2-CELL ANALYSIS AI    360  F4    RS P    T G $   559
SOLID CRYSTAL   MTS  7090  MAD   RSB       O $ BURP4, GAMMA-RAY PHOTOFRACTION   169
SOLID FUEL TUBE BUNDLES  LASL 7094  F2    RSBP      H $ AXTHRM, HEAT TRANSFER    183
SOLVER  ANL   3608 F4    RS P   C  P $ GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM   592
SOLVER  LLL   6600B F4    RS P      P $ GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM   592
SOPHIST1/2/5, MULTI-GP TRANSFER COEFFICIENTS   LLL  7090  F+FAP RS P    T B $   160
SORSDB, PRESSURE VESSEL STRESS AND FATIGUE     KAPL 6600  F4    RS        I $   391
SOR3, STRESS ANALYSIS SHELLS OF REVOLUTION     KAPL 6600C F4    RS P    T I $    80
SOURCE          MTS  7090  MAD   RSB       O $ BURP2, DETECTOR EFFICIENCY DISK   165
SOURCE          MTS  7090  MAD   RSB       O $ BURP1, DETECTOR EFFICIENCY POINT  164
SOURCE          MTS  7090  MAD   RSB       O $ BURP3, DETECTOR EFFICIENCY POINT  166
SOURCE  ANL  GETS  F    R        R $ PLETHS, ISOPLETH-AREA CALC FROM SINGLE     591
SOURCE BUILDUP FACTOR CALC     BAPL 6600  F+ASC RS P    T J $ ASPIS, GAMMA RAY  429
SOURCE DATA   NED   635  F4    RS P    T O $ EXPN, ANALYSIS OF PULSED NEUTRON   258
SOURCE DATA ANALYSIS   CNEA  360  F4    RS P      E $ TRIFIDO, PULSED NEUTRON   489
SPACE CHORD DIST FUNCT   AEB  7090  F2    RS        B $ DANCOFF JR, MODERATOR     150
SPACE POWER PLANT DESIGN OPTIMIZATION   AI   7090  F2    RS        I $ CROCK,    112
SPACE POWER PLANT DESIGN OPTIMIZATION   AI   7090  F2    RS        I $ SHOCK,    114
SPACE-DEPENDENT X-SECTION GENERATION   GEC   635  F4    RSBP    T B $ GROUSE,   420
SPACE-INDEPENDENT INVERSE KINETICS CALC  ANL   360  F4    RS P      E $ R102,     168
SPACE-INDEPENDENT INVERSE KINETICS CALC  ANL  3600  F63   RSBP      E $ R102,     168
SPACE-INDEPENDENT INVERSE KINETICS CALC  WANL 7094  F4    RS        E $ R102,     168
SPACE-INDEPENDENT KINETICS KEX OPTIONS   ANL   360  F4    RS P      E $ R101,     255
SPACE-INDEPENDENT KINETICS KEX OPTIONS   ANL   3600  F63   RSBP      E $ R101,     255
SPACE-INDEPENDENT KINETICS KEX OPTIONS   WANL 7094  F4    RS P      E $ R101,     255
SPACE-INDEPENDENT KINETICS W/FEEDBACK   AI   7094  F+MAP RS P    T E $ AIRCS,    163
SPACE-INDEPENDENT KINETICS W/FEEDBACK  AEB   360  F4    RS P      E $ AIREK3,   121
SPACE-INDEPENDENT KINETICS W/FEEDBACK  AI   7090  F2    RS        E $ AIREK3,   121
SPACE-INDEPENDENT KINETICS W/FEEDBACK  CDC  1604  F63   RS P      E $ AIREK3,   121
SPACE-INDEPENDENT REACTOR KINETICS   GGA  1108  F4    RS P      E $ GAPOTKIN,   317
SPACE-INDEPENDENT REACTOR KINETICS CODE ANL   360  F4    RS P    T E $ ANCON,    486
SPACE-INDEPENDENT REACTOR KINETICS CODE LASL 6600  F4    RS P    T E $ ANCON,    486
SPACE-TIME DIFFUSION           ANL   360  F4    RS P      F $ TWIGGLE, 2-D 2-GP   338
SPACE-TIME DIFFUSION FEEDBACK  BAPL 6600  F4    RS P    T F $ TWIGL, 2-D 2-GP   338
SPACE-TIME DIFFUSION FEEDBACK  BNL   6600  F4    RS P    T F $ NOAH, 1-D ONE-GP  405
SPACE-TIME DIFFUSION 3-GEOM    BAPL 6600  F4    RS P    T F $ WIGL2, 1-D 2-GP   274
SPACE-TIME DIFFUSION 3-GEOM    GGA  1108  F4    RS P    T F $ WIGL2, 1-D 2-GP   274
SPACE-TIME KINETICS  BCL  6400  F4    RS P    T F $ ADEP, 1D AND 2D FEW-GROUP  494
SPACE-TIME SYNTHESIS    KAPL 6600  F4    RS P      F $ STINT3, SINGLE-CHANNEL    389
SPAN4, A POINT-KERNEL SHIELD EVALUATION CODE   BAPL 6600B F+ASC RS P    T J $   462
SPARTA, SPATIALLY-AVERAGED DOPPLER EFFECTS     NED  2000  F2    RS P      B $   178
SPATIAL & COMPOSITION-DEPENDENT X-SECS  GESV  635  F+GMP RS P XCT L $ TDOWN,    505
SPATIAL REACTOR KINETICS CODE ANL   360  F4    RS PL CT F $ QX1, QUASISTATIC    474
SPATIAL REACTOR KINETICS CODE ANL   3600  36F   RS PL CT F $ QX1, QUASISTATIC   474
SPATIALLY-AVERAGED DOPPLER EFFECTS     NED  2000  F2    RS P      B $ SPARTA,   178
SPATIALLY-DEPENDENT REACTOR KINETICS      AI   360  F4    RS P    T F $ TSN,    309
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SPATIALLY-DEPENDENT REACTOR KINETICS        AI   7094  F+MAP RS P   T F $ TSN,     309
SPEC, TIME-OF-FLIGHT DATA ANALYSIS   GEES 1108  F5    RS P   T O $ CAGE,BIRD,     476
SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL   360  F4    RS P X T P $ FUNPACK,       610
SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL  1108  F5    RS P X T P $ FUNPACK,       610
SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL  6600  F4    RS F X T P $ FUNPACK,       610
SPECTRA       ORNL  360  F4    RS P     O $ ALPHA-M, RESOLUTION OF GAMMA RAY       413
SPECTRA    ANC    360  F+P+A RSBP XCT W $ GAUSS6, BATCH ANALYSIS OF GAMMA-RAY       622
SPECTRA & MULTI-GP CONSTANTS   ANC   360  F4    RS PL CT B $ INCITE, THERMAL        565
SPECTRA ANALYSIS     KAPL 6600  F4    RS      T O $ GASFAN, COMPLEX GAMMA-RAY     485
SPECTRA AND GROUP-AVERAGED X-SEC CALC GGA  1108  F4    RS F X T B $ GAF,GAR,       316
SPECTRA CALC   ANC   360  F4    RS PLXCT B $ PHROG, MULTI-GP CONSTANT & FAST       520
SPECTRA CALCULATION WITH DEPLETION    AERI 6600        RSBPLX T B $ LEOPARD,       279
SPECTRA CALCULATION WITH DEPLETION    JNC  1108  F5    RS  LX T B $ LEOPARD,       279
SPECTRA CALCULATION WITH DEPLETION    WAPD 360  F4    RS PLXCT B $ LEOPARD,       279
SPECTRA CODE BNW  1108  F+BAL RS P   T O $ GSSLRN1B, LEAST SQUARES PHOTOPEAK       457
SPECTRA ENDF/B DATA  ORNL  360  F4    RS P   T B $ RICE, PRIMARY RECOIL ATOM       453
SPECTRA GF(LI)   ANC   360  F4    RSBP XCT W $ GAUSS5, ANALYSIS OF GAMMA-RAY       605
SPECTRA GGA  1108  F+BAL RS P   T O $ TOAD, PROCESSING OF ANALYZER GAMMA-RAY       333
SPECTRA GGA  1108  F4    RS PLX T B $ GGC4, MULTI-GP X-SECTIONS FAST THERMAL       298
SPECTRA GGA  6600  F4    RS  L  T B $ GGC4, MULTI-GP X-SECTIONS FAST THERMAL       298
SPECTRA KSUN  360  F4    RS P     O $ CORGAM, UNFOLDING OF COMPLEX GAMMA-RAY       390
SPECTRA, MC CALCULATION IRRADIATED MATERIAL    GEC  7090  FAP   RSBP X T C $       422
SPECTROMETRY RED   360  F4    RS P     U $ DYNAMIC ANALYSIS OF GASES BY MASS       645
SPECTRUM AND X-SECTION CALCULATION NED  7094  F+FAP RS P   T B $ EPITHERMCS,       201
SPECTRUM CALC WITH BURNUP CYL LATTICE   TVA   360  F4    RSBPLXCT B $ LASER,       249
SPECTRUM CALC WITH BURNUP CYL LATTICE   WAPD 7094  F+MAP RS PLX T B $ LASER,       249
SPECTRUM MULTI-GP CONSTANT CALC  AGC  7090  F+FAP RSBPLX T B $ AGN-GAM, FAST       204
SPECTRUM X-SECTION CALC          BNW  1108  F5    RS PLX T B $ BRT1, THERMAL        184
SPECTRUM X-SECTION CALC     AI   7090  F2    RS PL  T B $ FORM, FAST NEUTRON        51
SPECTRUM X-SECTION CALC     ANL  3600  F63   RS  LX T B $ CAM1, FAST NEUTRON        33
SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PL  T B $ FORM, FAST NEUTRON        51
SPECTRUM X-SECTION CALC     CDC  1604  F63   RS PLX T B $ CAM1, FAST NEUTRON        33
SPECTRUM X-SECTION CALC     GGA  7090  F2    RS PLX T B $ CAM1, FAST NEUTRON        33
SPECTRUM X-SECTION CALC     OSUC  370  F4    RS PLXCT B $ FORM, FAST NEUTRON        51
SPECTRUM X-SECTION CALC  ANL  3600  F63   RSBP XCT B $ THERMOS(ANL), THERMAL       184
SPECTRUM X-SECTIONS   AI   7090  F+FAP RS  L  T B $ QUICKIE, INFINITE MEDIUM        119
SPECTRUM X-SECTIONS  AI   7090  F+FAP RS PL  T B $ TEMPEST2, THERMAL NEUTRON        50
SPECTRUM X-SECTIONS  BHSC  360  F4    RS PL  T B $ TEMPEST2, THERMAL NEUTRON        50
SPECTRUM X-SECTIONS  CDC  1604  F63   RS PL  T B $ TEMPEST2, THERMAL NEUTRON        50
SPECTRUM, MULTIGP CONSTANTS BNW  1108  F4    RS PLX T B $ HRG3, SLOWING-DOWN       467
SPECTRUM, MULTIGP CONSTANTS TVA  360  F4    RS PLX T B $ HRG3, SLOWING-DOWN       467
SPENT YANKEE-FUEL TEMPERATURE CALC    ORNL 1604  F2    RS F     H $ BIGDEAL,       549
SPH   PW   1604  F63   RS P     F $ AX-TNT, COUPLED NEUTRONICS-HYDRODYNAMICS       191
SPH  ANC   360  F4    RSBP  CT C $ MONA, 1-D MULTIGROUP DIFFUSION SLAB, CYL,       582
SPH, CYL GGA  1108  F+BAL RS P   T C $ GAZE2, 1-D MULTIGROUP DIFFUSION SLAB,       430
SPHERE    BNW  1107  F4    RS P   T C $ HFN, 1-D MULTI-GP DIFFUSION SLAB CYL        241
SPHERE    AI   7090  F+FAP RS  L  T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL        120
SPHERE    AI   7090  F+FAP RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL         29
SPHERE    CDC  1604  F63   RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL         29
SPHERE    CDC  1604  F63   RS PLX T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL        120
SPHERE    CDC  3600  F63   RSBP     F $ AX1, COUPLED NEUTRONICS-HYDRODYNAMICS       102
SPHERE    OSUC  370  F4    RS PL CT C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL         29
SPHERE  AEB   360  F4    RS  L  T C $ FIRE5, 1-D AGE-DIFFUSION SLAB CYLINDER          9
SPHERE  AI   7090  F+FAP RS  L  T C $ ULCER, 1-D MULTI-GP DIFFUSION SLAB CYL        118
SPHERE  ANL  3600  F36   RS P X T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL        262
SPHERE  MTS   360  F4    RSBPLXCT C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL        262
SPHERE  PURD 6500  F4    RS PLX T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL        262
SPHERE  PW   1604  LAG1  RS P     C $ MGDSN, 1-D MULTI-GP SN APPROX SLAB CYL        211
SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN, 1-D MULTI-GP SN APPROX SLAB CYL        132
SPHERE AI   7090  F2    RS P   T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER         28
SPHERE BC    625  F4    RS     T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER         28
SPHERE BHSC  360  F4    RS P   T C $ FAIMOS, 1-D MULTI-GP DIFFUSION SLAB CYL        120
SPHERE CDC  1604  F63   RS P   T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER         28
SPHERE GEOM  AI   7090  F2    RS P     J $ GRACE2, GAMMA-RAY ATTENUATION CYL         46
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SPHERE GEOM CDC 1604 F63 RS P J $ GRACE2, GAMMA-RAY ATTENUATION CYL 46
SPHERE GEOM SN TRANSPORT ANL 3600 F36 RS P XCT C $ TESS, 1-D SLAB AND 513
SPHERE LLL 7090 F2 RS P F $ CONEC, COUPLED NEUTRONICS-HYDRODYNAMICS 129
SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL SLA 1108 F+BAL RSBP T M $ 607
SQ LENS DESIGN SYSTEM LASL 6600 F+COM RS P T P $ LENSDES, NONLINEAR LEAST 602
SQ, NXN LATIN SQUARE EXPERIMENTAL DESIGN MLMC 360 F4 RSBP C P $ LATIN 630
SQUARE CELL COLLISION PROBABILITY CALC ANL 360 F4 RS P T B $ CLUP77, 526
SQUARE CELL COLLISION PROBABILITY CALC JAER 230 F4 RS P T B $ CLUP77, 526
SQUARE EXPERIMENTAL DESIGN MLMC 360 F4 RSBP C P $ LATIN SQ, NXN LATIN 630
SR 360 F4 RS P T I $ SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD 282
STABILITY ANALYSIS REACTOR KINETICS EQNS GGA 1108 F4 RS P E $ GASA, 290
STATIC & DYNAMIC STRUCTURAL ANALYSIS ANC 360 F4 RSBP CT I $ STRAP, 539
STATION ELECTRICITY COSTS ORNL 1604 F63 RS P C $ POWERCO, NUCLEAR 34
STATION ELECTRICITY COSTS UEC 6600 F4 RS P C $ POWERCO, NUCLEAR 340
STATISTICAL MODEL REACTION X-SECTIONS BNL 6600 F4 RS P A $ THRESH, 504
STATISTICAL RESONANCE PARAMETER CALC ENEA 360 F4 RS P A $ PSEUDO, 292
STATISTICAL RESONANCE PARAMETER CALC GGA 1108 F4 RS P A $ PSEUDO, 292
STATISTICS BKC 360 F4 RSBP P $ HISTOGRAMS, QUALITY CONTROL SAMPLE 614
STEADY-STATE AND TRANSIENT TEMP CALC GGA 1108 F5 RS P T H $ TAC2D, 408
STEADY-STATE FISSION PRODUCT FUEL MODEL ANC 360 F4 RSBP CT I $ FPFM, 584
STEADY-STATE FLOW DISTRIBUTION KAPL 6600 F4 RS P T H $ HAFMAT, SYSTEM 616
STEADY-STATE FLOW, PRESSURE DISTRIBUTION GGA 1108 F5 RS P H $ FLAC, 395
STEADY-STATE HEAT TRANSFER AI 7094 F+FAP RS P T H $ HEATING2, TRANSIENT 198
STEADY-STATE TEMPERATURE VOID FRACTION AI 7090 F2 RS I $ FUGUE, 48
STEADY-STATE THERMAL-HYDRAULIC ANALYSIS NED 635 F4 RS P T H $ MANTA, 256
STEADY-STATE THERMAL-HYDRAULIC ANALYSIS WARD 6600 F4 RS P T H $ MANTA, 256
STEAM GGA 1108 F4 RS P T H $ DYNAM, DYNAMIC ANALYSIS BOILING FLOW 440
STEAM ANC 360 F4 RS P T H $ ASTEM, THERMODYNAMIC PROPERTIES WATER & 580
STEAM AND WATER PROPERTIES BG&E 360B F4 RS T H $ STEAM-67, 1967 ASME 487
STEAM GENERATOR DESIGN CRITERIA COSTS GGA 7044 F4 RS P T D $ STMGEN, 227
STEAM GENERATOR SODIUM-WATER REACTION CEND 7600 F4 RS P T G $ CEBUG, 548
STEAM TABLES 14.5-14,500PSIA 32-472DEGF BAPL 6600 F4 RS T H $ WATER, 267
STEAM TABLES 14.5-2538 PSIA ANL 1604 F63 RS P H $ MOBBB,HOH, 294
STEAM TABLES 14.5-2538 PSIA BAPL 6600 F4 RS P T H $ MOBBB,HOH, 294
STEAM THERMODYNAMIC PROPERTIES BAPL 6600 F4 RS P T H $ WASP, WATER AND 396
STEAM-WATER MIX KAPL 6600 F4 RS P H $ RAPP, HIGH-VELOCITY FLOW STUDY 382
STEAM-67, 1967 ASME STEAM AND WATER PROPERTIES BG&E 360B F4 RS T H $ 487
STEFEG, ANALYSIS OF PWR & BWR GASEOUS RELEASE ORNL 360 F4 RS P C G $ 583
STEM, MATRIX GENERATION FOR A SYSTEM OF BEAMS KAPL 6600 F4 RS P I $ 337
STINT3, SINGLE-CHANNEL SPACE-TIME SYNTHESIS KAPL 6600 F4 RS P F $ 389
STMGEN, STEAM GENERATOR DESIGN CRITERIA COSTS GGA 7044 F4 RS P T D $ 227
STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN NPGS 360 F4 RS P X T E $ MOD5, 491
STORAGE ALLOC ORNL 360 BAL+F RS P CT P $ GETCOR,FRECOR, FORTRAN DYNAMIC 644
STORAGE, RETRIEVAL, AND DISPLAY DP 360 F+BAL S T M $ JOSHUA, DATA 490
STORAGE, SEARCH & RETRIEVAL SLA 1108 F+BAL RSBP T M $ SPIRAL, FULL-TEXT 607
STRAIN & PELLET CRACKING BAPL 6600 F4 RS P I $ STRIPE, FUEL ROD CLAD 570
STRAP, STATIC & DYNAMIC STRUCTURAL ANALYSIS ANC 360 F4 RSBP CT I $ 539
STRESS & DEFORMATION BAPL 6600 F4 RS P T I $ CYGRO3, OXIDE FUEL ROD 449
STRESS & DEFORMATION TVA 360 F4 RS P T I $ CYGRO3, OXIDE FUEL ROD 449
STRESS ANALYSIS KAPL 6600 F4 RS P I $ TUBE, U-TUBE HEAT EXCHANGER 378
STRESS ANALYSIS ANL 3600 F36 RS P T I $ SUPORAN, REACTOR CORE SUPPORT 357
STRESS ANALYSIS GGA 1108 F4 RS P I $ SAFE-2D, PLANE & AXISYMMETRIC 379
STRESS ANALYSIS AXISYM LOAD BAPL 6600 F4 RS P T I $ SEALSHELL2, SHELL 282
STRESS ANALYSIS AXISYM LOAD SR 360 F4 RS P T I $ SEALSHELL2, SHELL 282
STRESS ANALYSIS AXISYM LOAD WTSC 6600B F4 RS P T I $ SEAL SHELL, SHELL 282
STRESS ANALYSIS AXISYMMETRIC LOAD GGA 7044 F4 RSBP CT I $ SAFE-PORS, 250
STRESS ANALYSIS AXISYMMETRIC LOAD GGA 7044 F4 RS P T I $ SAFE-AXISYM, 251
STRESS ANALYSIS CYL FUEL ELEMENT BAPL 6600 F4 RS T I $ CYGRO2, 266
STRESS ANALYSIS MULTIANCHOR PIPE SYSTEM AI 360 F4 RS P CT I $ PSA2, 542
STRESS ANALYSIS SHELLS OF REVOLUTION KAPL 6600C F4 RS P T I $ SOR3, 80
STRESS ANALYSIS STUDY GGA 7044 F4 RS P T G $ ELBOW, FUEL ELEMENT 229
STRESS ANALYSIS THIN SHELLS GGA 1108 F4 RS P I $ SAFE-SHELL, 253
STRESS ANALYSIS, 2-D BODIES BNL 6600 F4 RS P T I $ SAFE-PLANE, PLANE 252
STRESS ANALYSIS, 2-D BODIES GGA 1108 F4 RS P I $ SAFE-PLANE, PLANE 252

STRESS TAPE

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STRESS AND FATIGUE      KAPL 6600  F4     RS        I $ SCRSCB, PRESSURE VESSEL     391
STRESS OF PIPING SYSTEM     BAPL 6600  F4     RS P    T I $ M0457,PIPE, ELASTIC     329
STRESS STUDY  GGA  1108  F4     RS P    T I $ SAFE-3D, 3-D COMPOSITE STRUCTURE     332
STRESS STUDY  ORNL  360  F+BAL RS P    T I $ SAFE-3D, 3-D COMPOSITE STRUCTURE     332
STRESS STUDY BAPL 6600  F+COM RS P    T I $ GAPL3, INELASTIC LARGE DEFLECTION     397
STRESS, MAXIMUM MOMENT CALC     AI   7090  F+FAP RS      T I $ 4RESTRAINT PIPE     109
STRIP, RESOLVED RESONANCE INTEGRAL CALCULATION BW    2000  F4     RS       A $     305
STRIPE, FUEL ROD CLAD STRAIN & PELLET CRACKING BAPL 6600  F4     RS P     I $     570
STRUCTURAL ANALYSIS      GGA  1108  F5     RS P    T I $ SHELL5, THIN SHELL 3-D     452
STRUCTURAL ANALYSIS     ANC   360  F4     RSBP  CT I $ STRAP, STATIC & DYNAMIC     539
STRUCTURAL ANALYSIS BOWED REACTOR CORES ANL    360B F4     RS P     I $ NUBOW,     643
STRUCTURAL ANALYSIS OF LINEAR SYSTEMS     ANL    360B F4     RS P    CT I $ SAP4,     641
STRUCTURAL DYNAMICS      BAPL 6600  F4     RS P    T I $ M0266, LINEAR ELASTIC     383
STRUCTURE STRESS STUDY  GGA  1108  F4     RS P    T I $ SAFE-3D, 3-D COMPOSITE     332
STRUCTURE STRESS STUDY  ORNL  360  F+BAL RS P    T I $ SAFE-3D, 3-D COMPOSITE     332
STRUCTURES   BAPL 6600  F4     RS P    T L $ BL47, DRAFTING TOOL TO PLOT PLANE     373
STRUCTURES   KAPL 6600  F4     RS P X    I $ FINEL, FINITE-ELEMENT STUDY 2,3-D     404
STRUCTURES  BAPL 6600  F4     RS P    T I $ FUGIT, DYNAMIC RESPONSE OF ELASTIC     537
SUBPROGRAMS AND MODULES      ANL    360  F+BAL RS P  CT M $ ARC-SYSTEM, SYSTEM     522
SUBROUTINE LIB.  NED    635  F+GMP RS      T P $ GENED ENVIRONMENTAL ROUTINES,     515
SUBROUTINE LIB. BAPL 6600A F+ASC RS      T P $ BETTIS ENVIRONMENTAL ROUTINES,     478
SUBROUTINE LIB. BW    6600B F+ASC RS      T P $ BETTIS ENVIRONMENTAL ROUTINES,     478
SUBROUTINE LIBRARY CAT. A-E  ANL    360  F+P+A RS      T P $ AMDLIBAE, ARGONNE     562
SUBROUTINE LIBRARY CAT. F     ANL    360  F+BAL RS      T P $ AMDLIBF, ARGONNE     563
SUBROUTINE LIBRARY CAT. G-Z  ANL    360  F+P+A RS      T P $ AMDLIBGZ, ARGONNE     564
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SUMMIT, CRYSTALLINE SCATTERING KERNEL CALC      GGA  7090  F2     RS      T A $      56
SUMOR, S-WAVE NEUTRON X-SECTION CALCULATION     BAPL 6600  F4     RS P    T A $     399
SUPERTOG, ENDF/B FINE-GP CONSTANTS GENERATION   ORNL  360  F4     RS P    T B $     431
SUPORAN, REACTOR CORE SUPPORT STRESS ANALYSIS  ANL    3600  F36    RS P    T I $     357
SUPPORT STRESS ANALYSIS  ANL    3600  F36    RS P    T I $ SUPCRAN, REACTOR CORE     357
SURVEY STUDY  BW    6600  F+COM RS P X T D $ FARED, 1-D FAST REACTOR DESIGN &     427
SWELLING & GAS RELEASE SIMULATION  BAPL 6600  F4     RS P    T I $ BUBL1, FUEL     468
SWELLING TEMPERATURE STUDY    BAPL 6600  F4     RS P    T H $ FIGRO, LWBR FUEL     272
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SYN, 2D SYNTHESIS MULTIGP DIFF & 1GP DEPLETION NED    635  F+GMP RS P    T D $     495
SYNTHESIS    KAPL 6600  F4     RS P      F $ STINT3, SINGLE-CHANNEL SPACE-TIME     389
SYNTHESIS  ANL    3600  F63    RSBP    T E $ TRAFICCORPORATION, TRANSFER FUNCTION     135
SYNTHESIS CALC    NED    635  F4     RS PL  T C $ BISYN, 2-D MULTI-GP DIFFUSION     287
SYNTHESIS CALC    NED   1108  F4     RS P    T C $ BISYN, 2-D MULTI-GP DIFFUSION     287
SYNTHESIS MULTIGP DIFF & 1GP DEPLETION NED    635  F+GMP RS P    T D $ SYN, 2D     495
SYNTHESIS PROGRAM CYL PW    1604  F63    RS      T C $ 2DXYL, 3-D MULTI-GP FLUX     192
S4 APPROXIMATION     AI   7090  F2     RS      B $ S4 CYL CELL CODE, 1-D 1-GP      53
S4 APPROXIMATION     CDC  1604  F63    RS P    B $ S4 CYL CELL CODE, 1-D 1-GP      53
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TAC3D, TRANSIENT 3-D HEAT TRANSFER PROGRAM      GGA  1108  F5     RS P    T H $     414
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TAPE PREPARATION     PW   1604  F63    RS      L $ CSP2A, SN X-SECTION LIBRARY     193
TAPE PROCESSING AND EDITING     ORNL  3608 F4     RS PL CT M $ EDITOR, ENDF/B     502
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TCB01, CREEP-BUCKLING OF TUBES UNDER PRESSURE  BAPL 6600  F4     RS P     I $     604
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TDSN, 2-D MULTIGROUP DISCRETE ORDINATE PROGRAM LER  7090  F+MAP RS P    T C $     312
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TEMPERATURE STUDY     BAPL 6600  F4    RS P    T H $ FIGRO, LWBR FUEL SWELLING   272
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THERMAL NEUTRON SPECTRUM X-SECTIONS  BHSC 360  F4    RS PL   T B $ TEMPEST2,     50
THERMAL NEUTRON SPECTRUM X-SECTIONS  CDC  1604  F63   RS PL   T B $ TEMPEST2,     50
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TVA   360  F4    RSBPLXCT B $ LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE        249
TWIGGLE, 2-D 2-GP SPACE-TIME DIFFUSION         ANL   360  F4    RS P     F $     338
TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK  BAPL 6600  F4    RS P   T F $     338
TWOTRAN-PNVW, 2-D PARTICLE TRANSPORT XY RZ RTH LASL 7600  F4    RS P   T C $     573
TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL  3600 F4    RSBP  CT C $     358
TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL 6600D F4    RS P   T C $     358
TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL 7600D F4    RS P   T C $     358
TYCHE3, MONTE CARLO SLOWING-DOWN DENSITY CALC  AI   7094  F+FAP RS PL  T B $     149
U-TUBE HEAT EXCHANGER STRESS ANALYSIS    KAPL 6600  F4    RS P     I $ TUBE,     378
UCND  3608 F+BAL RS P     D $ PMS1, FAST NEUTRON POLARIZATION EXPERIMENT         469
UEC  6600  F4    RS P     D $ NPRFCCP, FUEL CYCLE COSTS PERFORMANCE DATA         146
UEC  6600  F4    RS P     D $ PCWERCO, NUCLEAR STATION ELECTRICITY COSTS         340
UEC  6600  F4    RS P     D $ WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY         224
UGA   360  F4    RS P     G $ WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS LOFT        278
UHTREX   LASL 7090  F+FAP RS P     I $ WIREX, COMPUTER-PRODUCED WIRING LISTS     315
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UICS  360  F4     RS P   CT D $ GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS      576
UILL  360  F4     RS P       A $ CODILLI, LEAST SQUARES ANALYSIS RESONANCE DATA     347
UK-R 7090  F+FAP RSBPL   T C $ CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM        103
UK-W 7090  F2     RS        N $ WED, W-DSN OUTPUT TAPE EDIT REACTION RATES         133
UK-W 7090  F2     RS P    T C $ W-DSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE      132
ULCER, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  AI    7090  F+FAP RS  L  T C $      118
UMCC  360  F4     RS P    T C $ VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION         212
UNC  1604  F63    RS        C $ 2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE           173
UNC  1604  F63    RS PL   T C $ DTF, 1-D MULTIGROUP DISCRETE ORDINATE CALC         144
UNDER PRESSURE  BAPL 6600  F4     RS P      I $ TCB01, CREEP-BUCKLING OF TUBES     604
UNDER TSC    ANL   360  F+BAL R B L   T P $ TSC-SPEAKEASY, LANGUAGE PROCESSOR       593
UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA KSUN  360  F4     RS P      O $ CORGAM,      390
UNITS DUCO  635  F4     RS        G $ ANVENT, LOCA ANALYSIS DUKE POWER MCGUIRE     529
UNPACK, RETRIEVAL FROM SCISRS X-SECTION TAPE    GGA  7044  F+MAP RSBP     M $      206
UNRESOL RESONANCE XSEC PROBABILITY TABLES AI    360  F+BAL RS P  CT B $ U3R,        553
UNRESOLVED REGION AVERAGE X-SEC CALC  BNL  6600  F4     RS P      A $ AVERAGE,     376
UNRESOLVED REGION AVERAGE X-SEC CALC  BNL  7094  F4     RS P      A $ AVERAGE,     376
UNRESOLVED REGION RESONANCE INTEGRAL CALC GGA  7090  F+FAP RSB    T A $ TUZ,        42
UNRESOLVED RESONANCE INTEGRALS X-SECS    BAPL 6600  F4     RS P   T A $ PUN1,      359
UNRESOLVED RESONANCE X-SECTION CALC    GGA  1108B F4     RS P   T A $ GANDY3,      341
UNRESOLVED RESONANCES BAPL 6600  F4     RS P      A $ GRAMF, R-M PARAMETERS OF     470
URANIUM FUEL CYCLE COST ANALYSIS      AI   7090  F2     RS P      D $ AIMFIRE,      55
USER PROGRAM PERFORMANCE MONITOR      SLAC  360  F+BAL RS    CT P $ PROGLOOK,      642
USING DTF4 FLUXES   LASL 6600  F4     RS P      N $ DAC1, SN PERTURBATION CODE    455
UTILITIES ANC   360  F+BAL RS     T P $ NRTS ENVIRONMENTAL ROUTINES, FORTRAN       613
UTILITY MODULES, 2-D + 3-D PLOTTING   KAPL 6600  F+ASC RS F   T P $ CATATRAN       407
UTILITY MODULES, 2-D & 3-D PLOTTING   KAPL 6600B F+ASC R      T P $ CATATRAN       407
UTILITY PROGRAM        AI   7094  F+FAP RS  L  T M $ MOMUS, X-SECTION LIBRARY       159
UTILITY ROUTINE      ANL  3600  F63   RSBP   T M $ XLIBIT, X-SECTION LIBRARY       181
UTILITY ROUTINE  AI    360  F4    RSB L  T M $ CLIP, FORM OR THREDES LIBRARY        271
UTILITY ROUTINE ANL   360B BAL    RSB  X T P $ COPYCAT, IBM OS SYSTEM CATALOG       646
UVA  6400  F4     RS PLX T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV          185
U3R, UNRESOL RESONANCE XSEC PROBABILITY TABLES AI    360  F+BAL RS P  CT B $       553
VALUE DISTRIBUTION DATA ANALYSIS BAPL 6600  F4     RS P      P $ BH99, EXTREME       621
VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION     UMCC  360  F4     RS P   T C $       212
VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION     WANL 6600  F4     RS P   T C $       212
VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ RTH   WANL 7094  F4     RS P X T C $       264
VARI-1D, 1-D VARIATIONAL SENSITIVITY           ANL  3600  F4     RSBPL CT C $       625
VARIATIONAL SENSITIVITY              ANL   360  F4     RSBPL CT C $ VARI-1D, 1-D    625
VELVET2, TURBULENT FLOW IN LMFBR ROD BUNDLE    NED   635  F4     RS P   T H $       458
VENUS, 2-D LMFBR POWER EXCURSION DISASSEMBLY   ANL   360  F4     RS P XCT F $       511
VERSUS LEASE ANALYSIS   SLA   360  COBOL RSBP  CT M $ BECCM, AEC DP PURCHASE        589
VERSUS LEASE ANALYSIS   SLA  1108  COBOL RS P     M $ BECCM, AEC DP PURCHASE        589
VESSEL STRESS AND FATIGUE      KAPL 6600  F4     RS        I $ SORSDB, PRESSURE     391
VIBRATING SYSTEMS  KAPL 6600  F+ASC RS P   T I $ GEM, EIGENVALUE PROBLEM FOR        344
VIBRATION NEUTRON SCATTRING CODES ANC   360  F4     RS P  CT W $ MACS LATTICE        574
VIEW FACTOR CALC FOR CYLINDRICAL PINS ANC   360  F4     RSBP  CT J $ VIEWPIN,       569
VIEW FACTOR SHIELDING CODE CAVITY GEOM GGA  1108  F4     RS P   T J $ MUSCAT,        259
VIEWPIN, VIEW FACTOR CALC FOR CYLINDRICAL PINS ANC   360  F4     RSBP  CT J $        569
VIM1, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS   AI   7600  F4     RS PLX T C $        510
VIM1X, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS  AI-A  360  F4     RSBPL CT C $        510
VISCOELASTIC ANALYSIS CONCRETE       GGA  1108  F4     RS P      I $ SAFE-CREEP,   300
VISCOELASTIC ANALYSIS OF CONCRETE    GGA  1108  F5     RS P   T I $ SAFE-CRACK,    451
VOID FRACTION  AI   7090  F2     RS        I $ FUGUE, STEADY-STATE TEMPERATURE      48
VOID X-SECTION CALCULATION       GEC   625  F4     RS P      E $ AVOID, ANNULAR     276
V1 PROC BNL  6600B F4     RS        T M $ CHECKER,CRECT,DAMMET,PLOTFB,... ENDF/B   384
V2 PROC  BNL  6600B F4    RS        T M $ CRECT,CHECKER,RIGEL,PLOTFB,... ENDF/B    475
V2 PROCESSING CODES      ANL   360  F4     RS P   T M $ CRECT,CHECKER, ENDF/B       475
V3 DATA PROCESSING CODE          ANL   360  F4     RS        T M $ RIGEL, ENDF/B    571
V3 DATA TO THERMAL LIBRARY FORM  WAPD 7600  F4     RS P   T B $ ETOT3, ENDF/B       628
V3 PROCESSING CODES      BNL  6600  F4     RS        T M $ CHECK3,RIGEL3, ENDF/B    571
V4 PROCESSING CODES   BNL  6600B F4     RS        T M $ RIGEL4,CHECK4,... ENDF/B   638
W-DSN OUTPUT TAPE EDIT REACTION RATES     UK-W 7090  F2     RS        N $ WED,      133
W-DSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE  UK-W 7090  F2     RS P   T C $       132
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W/CONFIDENCE LIMITS    BKC    360  F4     RSBP      P $ GRAPH, LINEAR REGRESSION     624
WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY      GGA   7044  F4     RS P      C $     224
WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY      UEC   6600  F4     RS P      D $     224
WANL 6600  F4     RS  L   T B $ GAMB1T, X-SEC GENERATION FOR TRANSPORT CODES         547
WANL 6600  F4     RS P    T C $ VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION          212
WANL 7094  F+FAP RSBPL    T N $ CPS, SC4020 PLOTS FROM SCISRS X-SECTION TAPES       239
WANL 7094  F2     RS P      A $ EXT, X-SECTIONS FROM B-W RESONANCE PARAMETERS       238
WANL 7094  F4     RS        E $ R102, SPACE-INDEPENDENT INVERSE KINETICS CALC       168
WANL 7094  F4     RS P      E $ R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS        255
WANL 7094  F4     RS P X T C $ VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ RTH         264
WAPD  360  F4     RS PLXCT B $ LEOPARD, SPECTRA CALCULATION WITH DEPLETION          279
WAPD 6600  BCD    R   L   T Z $ ETOG1 DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2          447
WAPD 6600  F4     RS P    T B $ ETCM1, ENDF/B FORMAT TO MUFT FORMAT X-SECTIONS      436
WAPD 6600  F4     RS P    T D $ CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS       354
WAPD 6600  F4     RS PL   T B $ ETCG1, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT      437
WAPD 7094  F+MAP RS PLX T B $ LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE          249
WAPD 7600  F4     RS P    T B $ ETOG3, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT      538
WAPD 7600  F4     RS P    T B $ ETCT2, THERMAL LIBRARIES FROM ENDF/B DATA           509
WAPD 7600  F4     RS P    T B $ ETCT3, ENDF/B V3 DATA TO THERMAL LIBRARY FORM       628
WARD 6600  F4     RS P    T H $ MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS      256
WASP, WATER AND STEAM THERMODYNAMIC PROPERTIES BAPL 6600  F4     RS P    T H $     396
WATER & STEAM  ANC    360  F4     RS P    T H $ ASTEM, THERMODYNAMIC PROPERTIES     580
WATER AND STEAM THERMODYNAMIC PROPERTIES BAPL 6600  F4     RS P    T H $ WASP,       396
WATER PROPERTIES BG&E  360B F4     RS      T H $ STEAM-67, 1967 ASME STEAM AND       487
WATER REACTOR DESIGN   BNW   1108  F5     RS P    T H $ REPP, THERMAL-HYDRAULIC     483
WATER-COOLED CORE TRANSIENT ANALYSIS    ANC    360  F+BAL RSBPL CT G $ PARET,        555
WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS LOFT    UGA    360  F4     RS P      G $     278
WATER-LOGGED FUEL ELEMENT ANALYSIS      BAPL 6600  F4     RS P    T H $ GLUB1,      424
WATER, STEAM TABLES 14.5-14,500PSIA 32-472DEGF BAPL 6600  F4     RS      T H $     267
WAVE FUNCTION RADIAL INTEGRALS ORNL 1604  F63    RS P      A $ RAMES, PARTICLE       335
WEAK EXPLOSION, COUPLED NEUTRON-HYDRODYNAMICS   APDA 7094  F2     RS P      F $     145
WED, W-DSN OUTPUT TAPE EDIT REACTION RATES      UK-W 7090  F2     RS        N $     133
WEIGHT OPTIMIZATION DOSE CALC     AI    7094  F+FAP RS P      J $ SHOE, SHIELD          197
WEIGHT OPTIMIZATION STUDY    PW    1604  F63    RS        I $ WOPEXPRT, REACTOR     190
WELL CRYSTAL    MTS  7090  MAD    RSB      O $ BURP5, GAMMA-RAY PHOTOFRACTION        170
WELWING, MATERIAL BUCKLING CYL FUEL ELEMENTS    AEB    360  F4     RS P      B $     362
WHAM, LIQUID-FILLED PIPING SYSTEM ANALYSIS      KE    3600B F36    RSBP      G $     276
WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY   CDC   1604  F63    RS P    T C $      32
WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY   ORNL 7090  F2     RS P    T C $      32
WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM     BAPL 6600  F4     RS P    T F $     274
WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM     GGA   1108  F4     RS P    T F $     274
WIREX, COMPUTER-PRODUCED WIRING LISTS UHTREX    LASL 7090  F+FAP RS P      I $       315
WIRING LISTS UHTREX    LASL 7090  F+FAP RS P      I $ WIREX, COMPUTER-PRODUCED      315
WLIB,FLAT, RESONANCE ABSORPTION, CELL   ANL    3600  F36    RSBP X T B $ RABBLE,      281
WOODS-SAXON POTENTIAL SHAPE CALCULATION ORNL 7090  F2     RS        A $ LYNNE,        381
WOPEXPRT, REACTOR WEIGHT OPTIMIZATION STUDY     PW    1604  F63    RS        I $       190
WORKSTATION PKG   ANL    360  F+ASM RSB    CT P $ WSP-HASP/DCS, DCS-MFT REMOTE       541
WORKSTATION PKG   ANL    360B F+ASM RSB    CT P $ WSP-HASP/DCS, DCS-MFT REMOTE       541
WSP-HASP/DCS, DCS-MFT REMOTE WORKSTATION PKG    ANL    360  F+ASM RSB    CT P $    541
WSP-HASP/DCS, DCS-MFT REMOTE WORKSTATION PKG    ANL    360B F+ASM RSB    CT P $    541
WTSC 6600B F4     RS P    T I $ SEAL SHELL, SHELL STRESS ANALYSIS AXISYM LOAD       282
X-SEC   BNL  6600  F4     RS P      A $ BESFIT, DIFFRACTION MODEL ELASTIC SCAT        524
X-SEC & POLARIZATION CALC  KAPL 6600  F4     RS P    T A $ PHASER, PHASE SHIFT         507
X-SEC CALC     BNL  6600  F4     RS P      A $ SIGPLOT, RESOLVED MULTILEVEL B-W      377
X-SEC CALC   KAPL 6600  F4     RS P    T A $ JP1XR, COUPLED-CHANNEL SCATTERING   506
X-SEC CALC  BNL  6600  F4     RS P      A $ AVERAGE, UNRESOLVED REGION AVERAGE    376
X-SEC CALC  BNL  7094  F4     RS P      A $ AVERAGE, UNRESOLVED REGION AVERAGE    376
X-SEC CALC BNW  1108  F4     RS P    T B $ FCC4, FUNDAMENTAL MODE FAST REACTOR     306
X-SEC CALC GGA  1108  F4     RS P X T B $ GAF,GAR, SPECTRA AND GROUP-AVERAGED      316
X-SEC CALC ORNL  360  F+BAL RS P      D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX,   322
X-SEC CALC ORNL 1604  F63    RS P      D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX,   322
X-SEC EVALUATION      ENEA  360  F4     RS P    CT A $ JUPITOR1, COUPLED CHANNEL  308
X-SEC EVALUATION      ORNL 1604  F63    RS P    T A $ JUPITOR1, COUPLED-CHANNEL   308
X-SEC EVALUATION AI    360  F+BAL RSB L CT M $ SCORE3, SCISRS ENDF/B GRAPHIC     375
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X-SEC FORMAT WAPD 6600  F4    RS PL  T B $ ETOG1, ENDF/B TO MUFT, GAM, ANISN    437
X-SEC FORMAT WAPD 7600  F4    RS P   T B $ ETOG3, ENDF/B TO MUFT, GAM, ANISN    538
X-SEC GENERATION FOR TRANSPORT CODES   WANL 6600  F4    RS  L  T B $ GAMB1T,    547
X-SECS    BAPL 6600  F4    RS P    T A $ PUN1, UNRESOLVED RESONANCE INTEGRALS  359
X-SECS  GESV  635  F+GMP RS P XCT L $ TDOWN, SPATIAL & COMPOSITION-DEPENDENT   505
X-SECS BAPL 6600  F4    RS     T B $ MOB07, 2-D DIFFUSION ABSORPTION REMOVAL   280
X-SECTION AVERAGING     GGA  7044  F4    RS P     L $ CAVER, ENERGY INTERVAL    218
X-SECTION CALC          BNW  1108  F5    RS PLX T B $ BRT1, THERMAL SPECTRUM   184
X-SECTION CALC       AI   7090  F2    RS PL  T A $ ARES2, RESONANCE INTEGRAL    89
X-SECTION CALC       AI   7094  F+MAP RS PLX T A $ TRIX1, RESONANCE INTEGRAL   208
X-SECTION CALC       ANL  3600  F63   RSBP     A $ NEARREX, COMPOUND NUCLEUS    171
X-SECTION CALC       CDC  1604  F63   RS PL  T A $ ARES2, RESONANCE INTEGRAL    89
X-SECTION CALC       NED  2000  F2    RS P     A $ COPIE, RESOLVED RESONANCE    177
X-SECTION CALC     AI   7090  F2    RS PL  T B $ FORM, FAST NEUTRON SPECTRUM     51
X-SECTION CALC     ANL  3600  F63   RS  LX T B $ GAM1, FAST NEUTRON SPECTRUM     33
X-SECTION CALC     CDC  1604  F63   RS PL  T B $ FORM, FAST NEUTRON SPECTRUM     51
X-SECTION CALC     CDC  1604  F63   RS PLX T B $ GAM1, FAST NEUTRON SPECTRUM     33
X-SECTION CALC     GGA  7090  F2    RS PLX T B $ GAM1, FAST NEUTRON SPECTRUM     33
X-SECTION CALC     NED  2000  F2    RS P     A $ RAPTURE, RESONANCE INTEGRAL    176
X-SECTION CALC     OSUC  370  F4    RS PLXCT B $ FORM, FAST NEUTRON SPECTRUM     51
X-SECTION CALC    GGA  1108B F4    RS P   T A $ GANDY3, UNRESOLVED RESONANCE    341
X-SECTION CALC  ANL  3600  F63   RSBP XCT B $ THERMOS(ANL), THERMAL SPECTRUM    184
X-SECTION CALC ELASTIC SCAT RESONANCES AI    360  F4    RS PLX T B $ AILMOE,    147
X-SECTION CALC ELASTIC SCAT RESONANCES AI   7094  F+FAP RS PL  T B $ AILMOE,    147
X-SECTION CALC FROM DSN OUTPUT  PW   1604  LAG1  RS P     A $ DTX, EFFECTIVE    210
X-SECTION CALC MODERATOR GGA  1108  F4    RS P     A $ GAKER, INELASTIC SCAT    289
X-SECTION CALCULATION      CEC   625  F4    RS P     B $ AVOID, ANNULAR VOID    276
X-SECTION CALCULATION    BAPL 6600  F4    RS P   T A $ SUMOR, S-WAVE NEUTRON   399
X-SECTION CALCULATION    ANL   360  F4    RS P  CT B $ MC**2, ENDF MULTIGROUP  355
X-SECTION CALCULATION    ANL  3600  F36   RS P   T B $ MC**2, ENDF MULTIGROUP  355
X-SECTION CALCULATION  GGA  1108  F5    RS P     A $ FLANGE1, SCATTERING LAW  247
X-SECTION CALCULATION NED  7094  F+FAP RS P   T B $ EPITHERMOS, SPECTRUM AND   201
X-SECTION EVALUATION    CRNL 7090  F4    RSBP     A $ MUFFLE, FISSILE NUCLIDE 323
X-SECTION GENERATION    BNW  1108  F4    RS P X T B $ 1DX, 1-D DIFFUSION FAST 374
X-SECTION GENERATION    CEC   635  F4    RSBP   T B $ GROLSE, SPACE-DEPENDENT  420
X-SECTION GENERATION CODE   BAPL 6600  F+COM RS P X T B $ PAX03, HARMONY-PDQ   426
X-SECTION LIBRARY PREPARATION     GGA  1108  F4    RS P X T L $ GAND, GAFGAR   345
X-SECTION LIBRARY TAPE PREPARATION    PW   1604  F63   RS       L $ CSP1, SN   194
X-SECTION LIBRARY TAPE PREPARATION    PW   1604  F63   RS       L $ CSP2A, SN  193
X-SECTION LIBRARY UTILITY PROGRAM       AI   7094  F+FAP RS  L  T M $ MOMUS,    159
X-SECTION LIBRARY UTILITY ROUTINE      ANL  3600  F63   RSBP   T M $ XLIBIT,    181
X-SECTION MANIPULATION  ANL   360  F4    RSBPL CT L $ ARC-XSEC1, MICROSCOPIC   594
X-SECTION TAPE   GGA  7044  F+MAP RSBP     M $ UNPACK, RETRIEVAL FROM SCISRS   206
X-SECTION TAPES   GGA  7044  F+SPS RSBP   T N $ CROSSPLOT, SC4020 PLOTS FROM   207
X-SECTION TAPES  WANL 7094  F+FAP RSBPL  T N $ CPS, SC4020 PLOTS FROM SCISRS   239
X-SECTIONS   AI   7090  F+FAP RS  L  T B $ QUICKIE, INFINITE MEDIUM SPECTRUM   119
X-SECTIONS   LASL 7090  FLOCO RS P     B $ ZOT, GROUP-COLLAPSING OF MULTI-GP  113
X-SECTIONS  AI   7090  F+FAP RS PL  T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM    50
X-SECTIONS  AI   7094  F2    RS P   T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL   254
X-SECTIONS  ANL  3600  F63   RSBP   T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL   254
X-SECTIONS  BHSC  360  F4    RS PL  T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM    50
X-SECTIONS  BNL  6600  F4    RS P     A $ RAMP1, REICH-MOORE RESOLVED REGION   492
X-SECTIONS  BNL  6600  F4    RS P     A $ THRESH, STATISTICAL MODEL REACTION   504
X-SECTIONS  CDC  1604  F63   RS PL  T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM    50
X-SECTIONS FAST THERMAL SPECTRA GGA  1108  F4    RS PLX T B $ GGC4, MULTI-GP   298
X-SECTIONS FAST THERMAL SPECTRA GGA  6600  F4    RS  L  T B $ GGC4, MULTI-GP   298
X-SECTIONS FOR GAMMA-RAYS  GEC  7094  F4    RS P     B $ GAMMA-P, PRODUCTION   235
X-SECTIONS FROM B-W RESONANCE PARAMETERS  WANL 7094  F2    RS P     A $ EXT,   238
X-SECTIONS GGA  1108  F5    RS P   T B $ ENDFB2,GAND2,GFE2, ENDF/B TO GAFGAR   596
X-SECTIONS HEX LATTICE   GGA  1108  F4    RS       B $ HEXSCAT, ELASTIC SCAT   291
X-SECTIONS NED   635  F4    RS P   T B $ REAX, RESOLVED RESONANCE EPITHERMAL   257
X-SECTIONS PARAMETERS   AI   7094  F+FAP RS PL  T B $ GRAVE, GROUP-AVERAGING   162
X-SECTIONS WAPD 6600  F4    RS P   T B $ ETOM1, ENDF/B FORMAT TO MUFT FORMAT   436
XENON OSCILLATION    CEND  360  F4    RS P X T F $ CEXE,INCEXE, 1-GP 3-D XYZ   415
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XENON TRANSIENT & DEPLETION      KAPL 6600  F4     RS P    T C $ 3DXT,DEP3, 3-D     477
XLACS, XSDRN MULTIGROUP LIBRARIES FROM ENDF/B  ORNL  360  F4     RSBP XCT B $ XLACS,     572
XLIBIT, X-SECTION LIBRARY UTILITY ROUTINE        ANL  3600  F63    RSBP    T M $     181
XRAY DIFFRACTION POWDER PATTERN INDEXING LASL 6600  F+COM RS P    T Q $ INDX,      609
XSDRN MULTIGROUP LIBRARIES FROM ENDF/B  ORNL  360  F4     RSBP XCT B $ XLACS,     572
XSDRN, DISCRETE ORDINATE MULTIGROUP CONSTANTS  ORNL  360  F4     RS PLX T B $     393
XSEC CALC  KAPL 6600  F4     RS P     A $ MULTI, MULTI-LEVEL RESONANCE THEORY     535
XSEC LIBRARY MAINTENANCE NED    635  F4     RS P    T M $ TRCUT, MUG MULTIGROUP      493
XSEC LIBRARY MAINTENANCE NEC   1108  F5     RS P    T M $ TRCUT, MUG MULTIGROUP      493
XSEC PROBABILITY TABLES AI     360  F+BAL RS P   CT B $ U3R, UNRESCL RESONANCE      553
XSEC SETS, SN 18- 24- AND 25-GROUP SETS   LASL 6600  BCD    R    LX T Z $ LASL      532
XSECS. FROM B-W PARAMETERS     GGA  1108  F5     RS P   CT A $ FSDP3, POINTWISE     216
XSECTION CODES  BNL  6600B F4     RS P    T A $ RESEND,ADLER, ENDF/B RESONANCE     465
XY GEOM    AGC  7090  FLCCC RSBP     C $ 2DXY, 2-D MULTI-GP SN APPROXIMATION        18
XY RZ GEOMETRY GGA  1108  F+BAL RS P    T C $ GAMBLE5, 2-D MULTI-GP DIFFUSION      222
XY RZ GEOMETRY GGA  7044  F+MAP RSBP    T C $ GAMBLE4, 2-D MULTI-GP DIFFUSION      222
XY RZ RTH   WANL 7094  F4     RS P X T C $ VARI-QUIP3, 2-D MULTI-GP DIFFUSION      264
XY RZ RTH LASL 7600  F4     RS P    T C $ TWOTRAN-PNVW, 2-D PARTICLE TRANSPORT   573
XY RZ RTHETA  LASL  3600 F4     RSBP   CT C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT    358
XY RZ RTHETA  LASL 6600D F4     RS P    T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT    358
XY RZ RTHETA  LASL 7600D F4     RS P    T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT    358
XY RZ RTHETA GEOMETRY  BNW  1108  F4     RS P     C $ PERT4, 2-D PERTURBATION      304
XY, RZ GGA  1108  F+BAL RS P    T D $ BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP     438
XYZ GEOMETRY  CDC  1604  F63    RS P    T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION     32
XYZ GEOMETRY  ORNL 7090  F2     RS P    T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION     32
XYZ R-THETA-Z   LASL 6600  F4     RS P    T C $ 3DDT, 3-D MULTIGROUP DIFFUSION      463
XYZ XENON OSCILLATION    CEND  360  F4     RS P X T F $ CEXE,INCEXE, 1-GP 3-D       415
YANKEE-FUEL TEMPERATURE CALC    ORNL 1604  F2     RS P     H $ BIGDEAL, SPENT       549
YIELD FROM REACTION OR DECAY ORNL 1604  F63    RS P     D $ ISOTOPES, MAXIMUM    179
ZOT, GROUP-COLLAPSING OF MULTI-GP X-SECTIONS    LASL 7090  FLCCC RS P     B $     113
ZPR-III ASSEMBLY 48 GAFGAP ENDF/B DATA TAPES    GGA  1108  BIN    R    L  T Z $     356
ZUT, RESOLVED REGION RESONANCE INTEGRAL CALC    GGA  7090  F+FAP RSB     T A $      41
1- & 2-CELL ANALYSIS AI    360  F4     RS P    T G $ SOFIRE2, SODIUM POOL FIRE      559
1-D AGE-DIFFUSION SLAB CYLINDER SPHERE  AEB    360  F4     RS  L   T C $ FIRE5,       9
1-D AND 2-D MULTI-GP DIFFUSION PROGRAM   AAEC  360  F+BAL RS P    T C $ CRAM,      103
1-D AND 2-D MULTI-GP DIFFUSION PROGRAM   UK-R 7090  F+FAF RSBPL   T C $ CRAM,      103
1-D BURNUP POWER DISTRIBUTION SEARCH     GGA  1108  F4     RS P    T C $ GASP7,     319
1-D DIFFUSION FAST X-SECTION GENERATION   BNW  1108  F4     RS P X T B $ 1DX,        374
1-D FAST REACTOR DESIGN & SURVEY STUDY  BW    6600  F+COM RS P X T D $ FARED,       427
1-D FEW-GP DIFFUSION DEPLETION   GGA  7044  F4     RS P    T D $ RELOAD-FEVER,      221
1-D FEW-GP DIFFUSION DEPLETION PROGRAM  ANC    360  F4     RSBP   CT D $ DWARF,     579
1-D FEW-GP DIFFUSION DEPLETION PROGRAM  GGA  7090  F2     RSB     T D $ FEVER,     117
1-D FEW-GP DIFFUSION DESIGN SYSTEM    AI    360  F4     RSBF    T K $ THREDES,     273
1-D FEW-GP DIFFUSION POWER DIST SEARCH  GGA  7044  F4     RS P    T C $ GASP2,     220
1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE AI    7090  F2     RS P    T C $ FOG,        28
1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE BC     625  F4     RS      T C $ FOG,        28
1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE CDC  1604  F63    RS P    T C $ FOG,        28
1-D FEW-GP DIFFUSION TEMP COEF CALC      GGA  7044  F4     RS P    T C $ TEMCO,     225
1-D FEW-GP SN APPROXIMATION CYLINDER     PPCO 7040  F4     RS P    T C $ TOPIC,     148
1-D FEW-GP SN APPROXIMATION CYLINDER     PPCO 7090  F2     RS P    T C $ TOPIC,     148
1-D FEW-GP SN DOUBLE SN APPROX SLAB GEOM PPCO 7090  F2     RS P      C $ MIST,       59
1-D MULTI-GP DIFFUSION + LIB   AI    360  F4     RSBPLX T C $ CAESAR4,LIBLST,     270
1-D MULTI-GP DIFFUSION & INVENTORY  ANL    360  F4     RSBF   CT C $ ARC-DIFID,     626
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    BNW  1107  F4     RS P    T C $ HFN,       241
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   AI    7090  F+FAF RS  L   T C $ FAIM,      120
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   AI    7090  F+FAF RS PL   T C $ AIM6,       29
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604  F63    RS PL   T C $ AIM6,       29
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   CDC  1604  F63    RS PLX T C $ FAIM,       120
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   OSUC  370  F4     RS PL CT C $ AIM6,        29
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   AI   *7090  F+FAP RS  L   T C $ ULCER,      118
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   ANL  3600  F36    RS P X T C $ MACH1,      262
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   MTS   360  F4     RSBPLXCT C $ MACH1,      262
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   PURD 6500  F4     RS PLX T C $ MACH1,      262
1-D MULTI-GP DIFFUSION SLAB CYL SPHERE BHSC  360  F4     RS P    T C $ FAIMOS,    120
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1-D MULTI-GP DISCRETE ORDINATE CALC      AI   7090  F2    RS PLX T C $ DTF2,     151
1-D MULTI-GP DISCRETE ORDINATE CALC     AI    360  F4    RSBPLX T C $ ANISN,    151
1-D MULTI-GP DISCRETE ORDINATE CALC  ANL  3600  F36   RS P   T C $ SNARG-1D,    288
1-D MULTI-GP DISCRETE ORDINATE PROGRAM   ANL   360  F+BAL RS P   T C $ DTF4,     209
1-D MULTI-GP DISCRETE ORDINATE PROGRAM   BC    625  F+MAP RS P   T C $ DTF4,     209
1-D MULTI-GP DISCRETE ORDINATE PROGRAM   LASL 6600  F4    RS P   T C $ DTF4,     209
1-D MULTI-GP DISCRETE ORDINATE PROGRAM   LASL 7030  F4    RS P   T C $ DTF4,     209
1-D MULTI-GP DISCRETE ORDINATE PROGRAM   LER  7094  F4    RS P   T C $ DTF4,     209
1-D MULTI-GP COUBLE SN APPROX      BNW  7090  FLCCO RSBP   T C $ GE-HAPC-S13,     75
1-D MULTI-GP DTF4 WITH DEPLETION      LASL 7030  F4    RS P   T D $ DTF-BURN,    269
1-D MULTI-GP SN APPROX SLAB CYL SPHERE   PW   1604  LAG1  RS P     C $ MGDSN,    211
1-D MULTI-GP SN APPROX SLAB CYL SPHERE  UK-W 7090  F2    RS P   T C $ W-DSN,     132
1-D MULTIGP KINETICS WITH TEMP FEEDBACK GGA  1108  F4    RS P   T F $ GAKIT,     370
1-D MULTIGROUP DIFFUSION AND DEPLETION GGA  1108  F4    RS P   T D $ FEVER7,    318
1-D MULTIGROUP DIFFUSION DEPLETION      AI    360  F4    RSBP X T D $ SIZZLE,     58
1-D MULTIGROUP DIFFUSION DEPLETION      AI   7090  F2    RS  L  T D $ SIZZLE,     58
1-D MULTIGROUP DIFFUSION DEPLETION      CDC  1604  F63   RS  L  T D $ SIZZLE,     58
1-D MULTIGROUP DIFFUSION SLAB, CYL, SPH  ANC   360  F4    RSBP  CT C $ MONA,     582
1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL GGA  1108  F+BAL RS P   T C $ GAZE2,     430
1-D MULTIGROUP DISCRETE ORDINATE CALC    UNC  1604  F63   RS PL  T C $ DTF,      144
1-D MULTIGROUP REACTOR KINETICS PROGRAM  CRNL  360  F4    RS P XCT F $ TASK,     558
1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK BNL  6600  F4    RS P   T F $ NOAH,     405
1-D PERTURBATION FOR AIM AND FCC CODES   AI   7090  F2    RS       C $ PERT,      30
1-D PERTURBATION FOR AIM AND FOG CODES   BHSC  360  F4    RS P     C $ PERT,      30
1-D PERTURBATION FOR AIM AND FCC CODES   CDC  1604  F63   RS       C $ PERT,      30
1-D SLAB AND SPHERE GEOM SN TRANSPORT    ANL  3600  F36   RS P XCT C $ TESS,     513
1-D SLAB GAMMA-RAY TRANSPORT        BAPL 6600  F4    RS P   T J $ MG756,LETO,    343
1-D SLAB TRANSPORT WITH SLOWING DOWN     BAPL 6600  F4    RS     T C $ MO648,     342
1-D TIME-DEPENDENT DIFFUSION CALC     KAPL 6600  F4    RS P     F $ RAUMZEIT,    352
1-D TRANSPORT PERTURBATION THEORY       GGA  1108  F4    RS P XCT C $ GAPER1D,    606
1-D VARIATIONAL SENSITIVITY              ANL   360  F4    RSBFL CT C $ VARI-1D,    625
1-D 1-GP SN APPROXIMATION SLAB GEOMETRY  AI   7090  F2    RS P     B $ SAIL,       52
1-D 1-GP SN APPROXIMATION SLAB GEOMETRY  CDC  1604  F63   RS P     B $ SAIL,       52
1-D 1-GP S4 APPROXIMATION    AI   7090  F2    RS       B $ S4 CYL CELL CODE,       53
1-D 1-GP S4 APPROXIMATION    CDC  1604  F63   RS P     B $ S4 CYL CELL CODE,       53
1-D 2-GP KINETICS TEMPERATURE FEEDBACK  BAPL 6600  F4    RS P   T F $ NOWIG,     371
1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM    BAPL 6600  F4    RS P   T F $ WIGL2,     274
1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM    GGA  1108  F4    RS P   T F $ WIGL2,     274
1-GP SN APPROXIMATION SLAB GEOMETRY  AI   7090  F2    RS P     B $ SAIL, 1-D       52
1-GP SN APPROXIMATION SLAB GEOMETRY  CDC  1604  F63   RS P     B $ SAIL, 1-D       52
1-GP S4 APPROXIMATION    AI   7090  F2    RS       B $ S4 CYL CELL CODE, 1-D       53
1-GP S4 APPROXIMATION    CDC  1604  F63   RS P     B $ S4 CYL CELL CODE, 1-D       53
1-GP 3-D XYZ XENON OSCILLATION    CEND  360  F4    RS P X T F $ CEXE,INCEXE,      415
1-REGION KINETICS SNAP GEOMETRY  AI   7090  F2    RS       E $ SNAPKIN5/5A,        122
1D AND 2D FEW-GROUP SPACE-TIME KINETICS  BCL  6400  F4    RS P   T F $ ADEP,      494
1D MULTIGROUP TIME-DEPENDENT DIFFUSION MIT   370  F4    RS P   T F $ GAKIN2,     310
10X  HEDL 1108B F4    RS P X T B $ ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR     388
10X, 1-D DIFFUSION FAST X-SECTION GENERATION   BNW  1108  F4    RS P X T B $     374
1GP DEPLETION NED   635  F+CMP RS P   T D $ SYN, 2D SYNTHESIS MULTIGP DIFF &     495
1ST FLIGHT COLLISION PROBABILITIES MC  CRNL  3608 F+BAL RS P   T B $ RAFFLE,     392
10 MEV    BC    625  F4    RS PLX T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO      185
10 MEV    BNW  1107  F4    RS PL  T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO      185
10 MEV    BNW  7090  F+FAP RS PL  T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO      185
10 MEV    UVA  6400  F4    RS PLX T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO      185
1107  F4    RS P   T C $ HFN, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE    BNW      241
1107  F4    RS PL  T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV    BNW      185
1108  BIN   R   L  T Z $ ZPR-III ASSEMBLY 48 GAFGAR ENDF/B DATA TAPES  GGA      356
1108  COBOL RS P     M $ BECOM, AFC DP PURCHASE VERSUS LEASE ANALYSIS  SLA      589
1108  F+BAL RS P   T C $ GAMBLE5, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA     222
1108  F+BAL RS P   T C $ GAMTRI, 2-D MULTIGP DIFFUSION TRIANGULAR MESH  GGA     401
1108  F+BAL RS P   T C $ GAZE2, 1-D MULTIGROUP DIFFUSION SLAB, SPH, CYL GGA     430
1108  F+BAL RS P   T D $ BUGTRI, 2-D MULTIGP DIFFUSION+BURNUP TRI-MESH  GGA     439
1108  F+BAL RS P   T D $ BUG2, 2-D MULTIGROUP DIFFUSION & BURNUP XY, RZ GGA     438
1108  F+BAL RS P   T E $ BLCOST6, COMBINED KINETICS 2-D HEAT TRANSFER   GGA     303
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1108	F+BAL	RS	P		T	O	$	GSSLRN1B, LEAST SQUARES PHOTOPEAK SPECTRA CODE	BNW	457
1108	F+BAL	RS	P		T	O	$	TOAD, PROCESSING OF ANALYZER GAMMA-RAY SPECTRA	GGA	333
1108	F+BAL	RSBP			T	M	$	SPIRAL, FULL-TEXT STORAGE, SEARCH & RETRIEVAL	SLA	607
1108	F+SL	RS	P	XCT	R		$	HERMES, REGIONAL RADIOLOGICAL EFFECTS ANALYSIS	HEDL	527
1108	F4	S			T	D	$	GAFFE, EQUILIBRIUM FUEL CYCLE CALCULATION	GGA	302
1108	F4	RS				B	$	HEXSCAT, ELASTIC SCAT X-SECTIONS HEX LATTICE	GGA	291
1108	F4	RS			T	G	$	GADOSE,DOSET, HTGR ACCIDENT ANALYSIS DOSE CALC	GGA	261
1108	F4	RS		X	T	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	534
1108	F4	RS	P			A	$	GAKER, INELASTIC SCAT X-SECTION CALC MODERATOR	GGA	289
1108	F4	RS	P			A	$	GASKET, THERMAL SCATTERING LAW CALCULATION	GGA	263
1108	F4	RS	P			A	$	PSEUDO, STATISTICAL RESONANCE PARAMETER CALC	GGA	292
1108	F4	RS	P			C	$	PERT4, 2-D PERTURBATION XY RZ RTHETA GEOMETRY	BNW	304
1108	F4	RS	P			D	$	FREVAP6, HTGR METALLIC FISSION PRODUCT RELEASE	GGA	301
1108	F4	RS	P			E	$	GAPOTKIN, SPACE-INDEPENDENT REACTOR KINETICS	GGA	317
1108	F4	RS	P			E	$	GASA, STABILITY ANALYSIS REACTOR KINETICS EQNS	GGA	290
1108	F4	RS	P			G	$	SODOOL2, SODIUM-FUEL INTERACTION ANALYSIS	HEDL	521
1108	F4	RS	P			I	$	SAFE-CREEP, VISCOELASTIC ANALYSIS CONCRETE	GGA	300
1108	F4	RS	P			I	$	SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES	GGA	252
1108	F4	RS	P			I	$	SAFE-SHELL, STRESS ANALYSIS THIN SHELLS	GGA	253
1108	F4	RS	P			I	$	SAFE-2D, PLANE & AXISYMMETRIC STRESS ANALYSIS	GGA	379
1108	F4	RS	P			L	$	GRDWRK, GRID GENERATION FOR SAFE PROGRAMS	GGA	296
1108	F4	RS	P		T	A	$	TACASI, ANALYSIS OF RESONANCE MEASUREMENTS	GGA	410
1108	F4	RS	P		T	B	$	FCC4, FUNDAMENTAL MODE FAST REACTOR X-SEC CALC	BNW	306
1108	F4	RS	P		T	C	$	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC	NED	287
1108	F4	RS	P		T	C	$	GASP7, 1-D BURNUP POWER DISTRIBUTION SEARCH	GGA	319
1108	F4	RS	P		T	C	$	GATT, 3-D FEW-GP DIFFUSION CALC HEX-Z MESH	GGA	380
1108	F4	RS	P		T	C	$	TEMCO7, TEMPERATURE COEFFICIENT CALCULATION	GGA	320
1108	F4	RS	P		T	D	$	FEVER7, 1-D MULTIGROUP DIFFUSION AND DEPLETION	GGA	318
1108	F4	RS	P		T	D	$	GAUCE, 2-D FEW-GP HEX GEOM DIFFUSION DEPLETION	GGA	339
1108	F4	RS	P		T	D	$	PWCOST, REACTOR FUEL CYCLE COST CALCULATION	GGA	441
1108	F4	RS	P		T	D	$	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	BNW	325
1108	F4	RS	P		T	D	$	3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS	HEDL	567
1108	F4	RS	P		T	F	$	GAKIT, 1-D MULTIGP KINETICS WITH TEMP FEEDBACK	GGA	370
1108	F4	RS	P		T	F	$	WICL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	GGA	274
1108	F4	RS	P		T	G	$	PREP,KITT, SYSTEM FAULT TREE EVALLATION CODES	ANC	528
1108	F4	RS	P		T	G	$	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	369
1108	F4	RS	P		T	H	$	DYNAM, DYNAMIC ANALYSIS BOILING FLOW STEAM	GGA	440
1108	F4	RS	P		T	H	$	GAPCON-THERMAL1, FUEL PIN GAP CONDUCTANCE CALC	BNW	618
1108	F4	RS	P		T	H	$	LION, 3-D TEMPERATURE DISTRIBUTION PROGRAM	CHI	299
1108	F4	RS	P		T	H	$	MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC	ANC	551
1108	F4	RS	P		T	I	$	SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY	GGA	332
1108	F4	RS	P		T	J	$	MUSCAT, VIEW FACTOR SHIELDING CODE CAVITY GEOM	GGA	259
1108	F4	RS	P	X		A	$	COHEE, COHERENT INELASTIC SCATTERING LAW CALC	GGA	385
1108	F4	RS	P	X	T	B	$	GAF,GAR, SPECTRA AND GROUP-AVERAGED X-SEC CALC	GGA	316
1108	F4	RS	P	X	T	B	$	1DX, 1-D DIFFUSION FAST X-SECTION GENERATION	BNW	374
1108	F4	RS	P	X	T	L	$	GAND, GAFGAR X-SECTION LIBRARY PREPARATION	GGA	345
1108	F4	RS	P	XCT	C		$	GAPER1D, 1-D TRANSPORT PERTURBATION THEORY	GGA	606
1108	F4	RS	PLX	T	B		$	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA	GGA	298
1108	F4	RS	PLX	T	B		$	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	BNW	467
1108	F5	RS	LX	T	B		$	LECPARD, SPECTRA CALCULATION WITH DEPLETION	JNC	279
1108	F5	RS	P			A	$	FLANGE1, SCATTERING LAW X-SECTION CALCULATION	GGA	247
1108	F5	RS	P			H	$	FLAC, STEADY-STATE FLOW, PRESSURE DISTRIBUTION	GGA	395
1108	F5	RS	P		T	B	$	ENDFB2,GAND2,GFE2, ENDF/B TO GAFGAR X-SECTIONS	GGA	596
1108	F5	RS	P		T	C	$	2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE	GGA	173
1108	F5	RS	P		T	D	$	DBUFITI, LEAST SQUARES TRANSMUTATION ANALYSIS	BNW	456
1108	F5	RS	P		T	H	$	REPP, THERMAL-HYDRAULIC WATER REACTOR DESIGN	BNW	483
1108	F5	RS	P		T	H	$	TAC2D, STEADY-STATE AND TRANSIENT TEMP CALC	GGA	408
1108	F5	RS	P		T	H	$	TAC3D, TRANSIENT 3-D HEAT TRANSFER PROGRAM	GGA	414
1108	F5	RS	P		T	I	$	SAFE-CRACK, VISCOELASTIC ANALYSIS OF CONCRETE	GGA	451
1108	F5	RS	P		T	I	$	SHELL5, THIN SHELL 3-D STRUCTURAL ANALYSIS	GGA	452
1108	F5	RS	P		T	M	$	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE	NED	493
1108	F5	RS	P		T	N	$	GAPER2D, 2-D PERTURBATION CALC FROM 2DF OUTPUT	GGA	471
1108	F5	RS	P		T	O	$	CAGE,BIRD,SPEC, TIME-OF-FLIGHT DATA ANALYSIS	GEES	476
1108	F5	RS	P		T	R	$	TOFLYR2, POWER PLANT THERMAL DISCHARGE STUDY	HEDL	599

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1108  F5     RS P  CT A $ FSCP3, POINTWISE XSECS. FROM B-W PARAMETERS     GGA     216
1108  F5     RS P X T D $ PACTOLUS,CLOTHO, NUCLEAR POWER PLANT COST CODE HEDL     540
1108  F5     RS P X T F $ NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES      BNW     488
1108  F5     RS P X T P $ FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL     610
1108  F5     RS PLX T B $ BRT1, THERMAL SPECTRUM X-SECTION CALC           BNW     184
1108  F5     RSBPL  T D $ ISOGEN, RADIONUCLIDE GENERATION AND DECAY       BNW     367
1108B F4     RS P   T A $ GANDY3, UNRESOLVED RESONANCE X-SECTION CALC     GGA     341
1108B F4     RS P X T B $ ETOX3, MULTI-GP CONSTANTS FROM ENDF/B FOR 1DX   HEDL    388
1108C F4     RS P   T H $ COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS BNW     432
14.5-14,500PSIA 32-472DEGF BAPL 6600  F4     RS     T H $ WATER, STEAM TABLES     267
14.5-2538 PSIA          ANL  1604  F63   RS P     H $ MO899,HOH, STEAM TABLES     294
14.5-2538 PSIA          BAPL 6600  F4    RS P   T H $ MO899,HOH, STEAM TABLES     294
1604  F+CDP RS P   T P $ LAG, ASSEMBLER FOR FLOCO2 INSTRUCTION SET       PW      186
1604  F+CDP RS P X T B $ FMC-N,FMC-G, MC NEUTRON, GAMMA-RAY HISTORIES     PW      195
1604  F2    RS P     H $ BIGDEAL, SPENT YANKEE-FUEL TEMPERATURE CALC     CRNL    549
1604  F63   RS       C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES     CDC      30
1604  F63   RS       C $ TOP, 2-D PERTURBATION TOC OR 2DXY FLUX INPUT     PW      199
1604  F63   RS       C $ 2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE         UNC     173
1604  F63   RS       I $ WOPEXPRT, REACTOR WEIGHT OPTIMIZATION STUDY      PW      190
1604  F63   RS       L $ CSP1, SN X-SECTION LIBRARY TAPE PREPARATION      PW      194
1604  F63   RS       L $ CSP2A, SN X-SECTION LIBRARY TAPE PREPARATION     PW      193
1604  F63   RS     T C $ 2DXYL, 3-D MULTI-GP FLUX SYNTHESIS PROGRAM CYL   PW      192
1604  F63   RS  L  T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION       CDC      58
1604  F63   RS P     A $ HAFEVER, HAUSER-FESHBACH INELASTIC SCATTERING    CDC      14
1604  F63   RS P     A $ PEGGY, ELASTIC SCATTERING PHASE-SHIFT ANALYSIS   CRNL    334
1604  F63   RS P     A $ RAMES, PARTICLE WAVE FUNCTION RADIAL INTEGRALS   ORNL    335
1604  F63   RS P     B $ SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY    CDC      52
1604  F63   RS P     B $ S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION      CDC      53
1604  F63   RS P     D $ ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS         CRNL    180
1604  F63   RS P     D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC   ORNL    322
1604  F63   RS P     D $ ISOTOPES, MAXIMUM YIELD FROM REACTION OR DECAY   CRNL    179
1604  F63   RS P     D $ POWERCO, NUCLEAR STATION ELECTRICITY COSTS       ORNL    340
1604  F63   RS P     E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK    CDC     121
1604  F63   RS P     E $ CMPXMAT, TRANSFER FUNCTION EVALUATION            PW      188
1604  F63   RS P     F $ AX-TNT, COUPLED NEUTRONICS-HYDRODYNAMICS SPH     PW      191
1604  F63   RS P     G $ CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD          CDC      47
1604  F63   RS P     H $ MO899,HOH, STEAM TABLES 14.5-2538 PSIA           ANL     294
1604  F63   RS P     J $ GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY      CDC      45
1604  F63   RS P     J $ GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM    CDC      46
1604  F63   RS P     L $ SNC, CALCULATION OF SN CONSTANTS FOR DSN TOC     PW      189
1604  F63   RS P   T A $ JUPITOR1, COUPLED-CHANNEL X-SEC EVALUATION       CRNL    308
1604  F63   RS P   T C $ EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB    CDC      87
1604  F63   RS P   T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE   CDC      28
1604  F63   RS P   T C $ FORTRAN TOC, 2-D MULTI-GP SN APPROXIMATION RZ    PW      161
1604  F63   RS P   T C $ WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY    CDC      32
1604  F63   RS P   T C $ 2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER   CDC      40
1604  F63   RS P   T I $ PIP, CENTRIFUGAL PUMP IMPELLER DESIGN STUDY      PW      187
1604  F63   RS PL  T A $ ARES2, RESONANCE INTEGRAL X-SECTION CALC         CDC      89
1604  F63   RS PL  T B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC       CDC      51
1604  F63   RS PL  T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS    CDC      50
1604  F63   RS PL  T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE     CDC      29
1604  F63   RS PL  T C $ DTF, 1-D MULTIGROUP DISCRETE ORDINATE CALC       UNC     144
1604  F63   RS PLX T B $ GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC       CDC      33
1604  F63   RS PLX T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE     CDC     120
1604  LAG1  RS P     C $ MGDSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE    PW      211
1604  LAG1  RS P     N $ DTX, EFFECTIVE X-SECTION CALC FROM DSN OUTPUT    PW      210
18- 24- AND 25-GROUP SETS   LASL 6600  BCD    R   LX T Z $ LASL XSEC SETS, SN     532
1967 ASME STEAM AND WATER PROPERTIES BG&E  360B F4     RS     T H $ STEAM-67,     487
2- OR 3-D HEAT CONDUCTION LUMPED MASS     LASL 7030  F4     RS     T H $ RATH,     242
2- OR 3-D HEAT CONDUCTION LUMPED MASS     LASL 7094  FAP    RS P   T H $ RATH,     242
2-CELL ANALYSIS AI    360  F4     RS P   T G $ SOFIRE2, SODIUM POOL FIRE 1- &     559
2-D + 3-D PLOTTING    KAPL 6600  F+ASC RS P   T P $ DATATRAN UTILITY MODULES,     407
2-D & 3-D PLOTTING    KAPL 6600B F+ASC R      T P $ DATATRAN UTILITY MODULES,     407
2-D AXISYMMETRIC & PLANE ELASTIC-PLASTIC BAPL 6600  F+COM RS P   T I $ DUZ2,      503
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2-D BODIES  BNL  6600  F4    RS P   T I $ SAFE-PLANE, PLANE STRESS ANALYSIS,    252
2-D BODIES  GGA  1108  F4    RS P     I $ SAFE-PLANE, PLANE STRESS ANALYSIS,    252
2-D DESIGN PROGRAMS  LASL 7090  F+FAP RS P   T L $ DPC, DATA PREPARATION FOR    234
2-D DIFFUSION ABSORPTION REMOVAL X-SECS BAPL 6600  F4    RS      T B $ MOBO7,    280
2-D EXCURSION CALCULATION R-Z GEOMETRY   APDA 7094  F4    RS P     F $ MARS,    293
2-D FEW-GP DIFFUSION BURNUP RZ GEOMETRY   GGA  7090  F+FAP RSBP   T C $ DDB,     99
2-D FEW-GP HEX GEOM DIFFUSION DEPLETION GGA  1108  F4    RS P   T D $ GAUGE,    339
2-D FEW-GP S4 APPROXIMATION RZ GEOMETRY  LLL   709  F2    RS       C $ FIRN,      7
2-D FEW-GROUP DIFFUSION AND DEPLETION    IBM   360A F+BAL RS P   T D $ PDO5,    336
2-D FEW-GROUP DIFFUSION AND DEPLETION    MIT   360B F+BAL RSBP   T D $ PDO5,    336
2-D FEW-GROUP DIFFUSION SLAB CYLINDER CDC  1604  F63   RS P   T C $ 20GRAND,     40
2-D FEW-GROUP DIFFUSION SLAB CYLINDER ORNL 7090  F2    RS P   T C $ 20GRAND,     40
2-D FLUX SETS   GESV H600  F4    RS P  CT C $ TRIAL, 3-D REACTION RATES FROM    585
2-D GEOMETRY INPUT, PREPARATION, EDIT KAPL 6600B F+ASC P      T L $ DATATRAN    406
2-D HEAT TRANSFER   GGA  1108  F+BAL RS P   T E $ BLOCST6, COMBINED KINETICS    303
2-D HEAT TRANSFER GGA  7044  F+MAP RS P   T H $ BLOCST5, POINT-KINETICS WITH    205
2-D HETEROGENEOUS REACTOR CALCULATION OP    360B F4    RSBF  CT C $ HERESY3,    136
2-D HYDRODYNAM RESPONSE TO EXCURSION  ANL   360  F4    RS P  CT F $ REXCO-H,    550
2-D HYDRODYNAM RESPONSE TO EXCURSION ANL   360  F4    RS P  CT F $ REXCO-H2,   615
2-D LAGRANGIAN EQNS OF MOTION SOLUTION SLA  3600  F36   RS P   T S $ TOODY2,    627
2-D LMFBR POWER EXCURSION DISASSEMBLY   ANL   360  F4    RS P XCT F $ VENUS,    511
2-D MONTE CARLO CELL CALCULATION   AI    360  F+BAL RS P X T B $ HWCCR-SAFE,    307
2-D MULTI-GP DIFFUSION      UMCC  360  F4    RS P   T C $ VARI-QUIR, TIME-DEP    212
2-D MULTI-GP DIFFUSION      WANL 6600  F4    RS P   T C $ VARI-QUIR, TIME-DEP    212
2-D MULTI-GP DIFFUSION DEPLETION CODE ORNL 7090  F+FAP RS P   T D $ ASSAULT,     240
2-D MULTI-GP DIFFUSION PROGRAM   AAEC  360  F+BAL RS P   T C $ CRAM, 1-D AND     103
2-D MULTI-GP DIFFUSION PROGRAM   ORNL 7090  F+FAP RS P   T C $ EXTERMINATOR,     156
2-D MULTI-GP DIFFUSION PROGRAM   UK-R 7090  F+FAP RSBPL  T C $ CRAM, 1-D AND     103
2-D MULTI-GP DIFFUSION PROGRAM  BC    625  F4    RS      T C $ EXTERMINATOR2,    156
2-D MULTI-GP DIFFUSION PROGRAM  CE   6600  F4    RS P   T C $ EXTERMINATOR2,     156
2-D MULTI-GP DIFFUSION PROGRAM  ORNL  360  F4    RS P   T C $ EXTERMINATOR2,     156
2-D MULTI-GP DIFFUSION SYNTHESIS CALC   NED   635  F4    RS PL  T C $ BISYN,     287
2-D MULTI-GP DIFFUSION SYNTHESIS CALC   NED  1108  F4    RS P   T C $ BISYN,     287
2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  1108  F+BAL RS P   T C $ GAMBLE5,     222
2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA  7044  F+MAP RSBP   T C $ GAMBLE4,     222
2-D MULTI-GP DIFFUSION XY RZ RTH   WANL 7094  F4    RS P X T C $ VARI-QUIR3,    264
2-D MULTI-GP DISCRETE ORDINATE CODE        GGA  1108  F5    RS P   T C $ 2DF,     173
2-D MULTI-GP DISCRETE ORDINATE CODE        UNC  1604  F63   RS      C $ 2DF,     173
2-D MULTI-GP SN APPROXIMATION RZ  PW   1604  F63   RS P   T C $ FORTRAN TDC,     161
2-D MULTI-GP SN APPROXIMATION XY GEOM     AGC  7090  FLCCC RSBP     C $ 2DXY,     18
2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL  3600 F4    RSBF  CT C $ TWOTRAN2,     358
2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL 6600D F4    RS P   T C $ TWOTRAN2,     358
2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL 7600D F4    RS P   T C $ TWOTRAN2,     358
2-D MULTIGP DIFFUSION TRIANGULAR MESH  GGA  1108  F+BAL RS P   T C $ GAMTRI,     401
2-D MULTIGP DIFFUSION+BURNUP TRI-MESH  GGA  1108  F+BAL RS P   T D $ BUGTRI,     439
2-D MULTIGROUP DIFFUSION & BURNUP XY, RZ GGA  1108  F+BAL RS P   T D $ BUG2,     438
2-D MULTIGROUP DIFFUSION & SN THEORY   NED   635  F4    RS P   T C $ DOT2DB,     459
2-D MULTIGROUP DIFFUSION AND DEPLETION     ANL  3600  F4    RSBP   T C $ 2DB,     325
2-D MULTIGROUP DIFFUSION AND DEPLETION     BNW  1108  F4    RS P   T C $ 2DB,     325
2-D MULTIGROUP DIFFUSION AND DEPLETION     LASL 6600  F4    RS P   T D $ 2DB,     325
2-D MULTIGROUP DISCRETE ORDINATE PROGRAM LER  7090  F+MAP RS P   T C $ TDSN,     312
2-D PARTICLE TRANSPORT XY RZ RTH LASL 7600  F4    RS P   T C $ TWOTRAN-PNVW,    573
2-D PERTURBATION CALC FROM 2DF OUTPUT GGA  1108  F5    RS P   T N $ GAPER2D,     471
2-D PERTURBATION TDC OR 2DXY FLUX INPUT   PW   1604  F63   RS      C $ TDP,      199
2-D PERTURBATION XY RZ RTHETA GEOMETRY  BNW  1108  F4    RS P     C $ PERT4,    304
2-D TIME-DEPENDENT HEAT CONDUCTION      PPCO 7044  F+MAP RS P   T H $ TOODEE,     349
2-D TRANSIENT HEAT CONDUCTION PROGRAM     BAPL 6600  F4    RS P   T H $ HOT2,     286
2-D TRIANGULAR MESH TRANSPORT PROGRAM LASL  360  F4    RSBP  CT C $ TRIPLET,     608
2-D TRIANGULAR MESH TRANSPORT PROGRAM LASL 6600  F4    RS P   T C $ TRIPLET,     608
2-D TRIANGULAR MESH TRANSPORT PROGRAM LASL 7600  F4    RS P   T C $ TRIPLET,     608
2-D 2-GP DIFFUSION CYLINDER SLAB  CDC  1604  F63   RS P   T C $ EQUIPOISE3A,     87
2-D 2-GP DIFFUSION CYLINDER SLAB  ORNL 7090  F2    RS P   T C $ EQUIPOISE3A,     87
2-D 2-GP SPACE-TIME DIFFUSION          ANL   360  F4    RS P     F $ TWIGGLE,    338
2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK  BAPL 6600  F4    RS P   T F $ TWIGL,      338
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2-D                                                                                    3-D

2-D 2-GROUP DIFFUSION SLAB CYL      CRNL 7090  F2    RS P    T C $ EQUIPOISE3,      39
2-D 2-PHASE FLOW      AI   7094  F2    RS P     H $ FLOW-MODEL, MULTI-CHANNEL     246
2-D 2-PHASE FLOW      MSS   360  F4    RS P     H $ FLOW-MODEL, MULTI-CHANNEL     246
2-DIMENSIONAL HEAT CONDUCTION   CRNL  360  F4    RS P X T H $ ORTHIS,ORTHAT,     525
2-GP DIFFUSION CYLINDER SLAB  CDC  1604  F63   RS P    T C $ EQUIPOISE3A, 2-D     87
2-GP DIFFUSION CYLINDER SLAB  ORNL 7090  F2    RS P    T C $ EQUIPOISE3A, 2-D     87
2-GP KINETICS TEMPERATURE FEEDBACK  BAPL 6600  F4    RS P    T F $ NOWIG, 1-D     371
2-GP SPACE-TIME DIFFUSION         ANL   360  F4    RS P    F $ TWIGGLE, 2-D     338
2-GP SPACE-TIME DIFFUSION FEEDBACK  BAPL 6600  F4    RS P    T F $ TWIGL, 2-D     338
2-GP SPACE-TIME DIFFUSION 3-GEOM    BAPL 6600  F4    RS P    T F $ WIGL2, 1-D     274
2-GP SPACE-TIME DIFFUSION 3-GEOM    GGA  1108  F4    RS P    T F $ WIGL2, 1-D     274
2-GROUP DIFFUSION SLAB CYL      CRNL 7090  F2    RS P    T C $ EQUIPOISE3, 2-D     39
2-GROUP DIFFUSION XYZ GEOMETRY  CDC  1604  F63   RS P    T C $ WHIRLAWAY, 3-D     32
2-GROUP DIFFUSION XYZ GEOMETRY  ORNL 7090  F2    RS P    T C $ WHIRLAWAY, 3-D     32
2-PASS ASSEMBLER FOR THE PDP-11 ON 360 ANC   360  PL1   RS P    T P $ PTAC11,    516
2-PHASE FLOW      AI   7094  F2    RS P     H $ FLOW-MODEL, MULTI-CHANNEL 2-D    246
2-PHASE FLOW      MSS   360  F4    RS P     H $ FLOW-MODEL, MULTI-CHANNEL 2-D    246
2-REG CELL  ANL   3600  F36   RSBP X T B $ RIFF-RAFF, RESONANCE INTEGRAL CALC    213
2D CONTOUR PLOTS & AREA CALCULATION     SLA  6600  F4    RS P     P $ PLOTR,      578
2D DIFFUSION BURNUP REFUELING HISTORY  LASL 6600  F4    RS P    T D $ PHENIX,    454
2D FEW-GROUP SPACE-TIME KINETICS  BCL  6400  F4    RS P    T F $ ADEP, 1D AND    494
2D SYNTHESIS MULTIGP DIFF & 1GP DEPLETION NED   635  F+GMP RS P    T C $ SYN,      495
2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION     ANL  3600  F4    RSBP   T C $     325
2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION     BNW  1108  F4    RS P   T D $     325
2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION     LASL 6600  F4    RS P   T D $     325
2DF OUTPUT GGA  1108  F5    RS P    T N $ GAPER2D, 2-D PERTURBATION CALC FROM    471
2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE        GGA  1108  F5    RS P   T C $     173
2DF, 2-D MULTI-GP DISCRETE ORDINATE CODE        UNC  1604  F63   RS      C $     173
2DXY FLUX INPUT   PW   1604  F63   RS      C $ TDP, 2-D PERTURBATION TOC OR      199
2DXY, 2-D MULTI-GP SN APPROXIMATION XY GEOM     AGC  7090  FLOCC RSBP    C $      18
2DXYL, 3-D MULTI-GP FLUX SYNTHESIS PROGRAM CYL  PW   1604  F63   RS      T C $    192
2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS   AI   7094  F2    RS P   T A $     254
2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS   ANL  3600  F63   RSBP   T A $     254
2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER  CDC  1604  F63   RS P   T C $      40
2DGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER  ORNL 7090  F2    RS P   T C $      40
2000  F2    RS P     A $ DOPIE, RESOLVED RESONANCE X-SECTION CALC        NED      177
2000  F2    RS P     A $ RAPTURE, RESONANCE INTEGRAL X-SECTION CALC      NED      176
2000  F2    RS P     B $ SPARTA, SPATIALLY-AVERAGED DOPPLER EFFECTS      NED      178
2000  F4    RS       A $ STRIP, RESOLVED RESONANCE INTEGRAL CALCULATION BW         305
2000  F4    RS P   T F $ FOPE, FAST REACTOR EXCURSION CALCULATIONS      NED      174
230  F4    RS P   T B $ CLUP77, SQUARE CELL COLLISION PROBABILITY CALC JAER      526
24- AND 25-GROUP SETS   LASL 6600  BCD   R   LX T Z $ LASL XSEC SETS, SN 18-     532
25-GROUP SETS   LASL 6600  BCD   R   LX T Z $ LASL XSEC SETS, SN 18- 24- AND     532
3-D COMPOSITE STRUCTURE STRESS STUDY  GGA  1108  F4    RS P   T I $ SAFE-3D,     332
3-D COMPOSITE STRUCTURE STRESS STUDY  ORNL  360  F+BAL RS F   T I $ SAFE-3D,     332
3-D DIFFUSION DEPLETION MULTIGP  ORNL  360H F4    RS P   T K $ CITATION, 1,2,    387
3-D FEW-GP DIFFUSION CALC HEX-Z MESH    GGA  1108  F4    RS P   T C $ GATT,       380
3-D FEW-GP DIFFUSION DEPLETION    ANC   360F F+BAL RS P XCT D $ PDQ7, 1,2 OR     275
3-D FEW-GP DIFFUSION DEPLETION    BAPL 6600A F+ASC RS P   T C $ PDQ7, 1,2 OR     275
3-D FEW-GP DIFFUSION DEPLETION    BAPL 6600C F+ASC RS P   T D $ PDQ7, 1,2 OR     275
3-D FEW-GP DIFFUSION DEPLETION    BCS  6600D F+ASC R B    T D $ PDQ7, 1,2 OR     275
3-D FEW-GP DIFFUSION DEPLETION    BW   6600B F+ASC RS P   T D $ PDQ7, 1,2 OR     275
3-D FINITE ELEMENT ELASTIC ANALYSIS     BAPL 6600  F+COM RS P X T I $ MATUS,     597
3-D HEAT CONDUCTION LUMPED MASS   LASL 7030  F4    RS      T H $ RATH, 2- OR     242
3-D HEAT CONDUCTION LUMPED MASS   LASL 7094  FAP   RS P   T H $ RATH, 2- OR      242
3-D HEAT CONDUCTION PROGRAM  ORNL  360  F4    RS P   T H $ HEATING3, 1,2, OR     517
3-D HEAT TRANSFER PROGRAM   GGA  1108  F5    RS P   T H $ TAC3D, TRANSIENT      414
3-D MULTI-GP FLUX SYNTHESIS PROGRAM CYL PW   1604  F63   RS      T C $ 2DXYL,      192
3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS  ANL  360  F4    RS P  CT C $ 3DB,        567
3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS  HEDL 1108  F4    RS P   T D $ 3DB,        567
3-D MULTIGROUP DIFFUSION XYZ R-THETA-Z  LASL 6600  F4    RS P   T C $ 3DDT,       463
3-D PLOTS ON IBM2280 OR CALCOMP780   ANL  360  F4    RS P   T N $ PLOT-3D,     544
3-D PLOTTING   KAPL 6600  F+ASC RS P   T P $ DATATRAN UTILITY MODULES, 2-D +     407
3-D PLOTTING   KAPL 6600B F+ASC R      T P $ DATATRAN UTILITY MODULES, 2-D &     407
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3-D REACTION RATES FROM 2-D FLUX SETS   GESV H600  F4    RS P  CT C $ TRIAL,     585
3-D REACTIVITY AND POWER DISTRIBUTION   CDC  3600  F63   RSBP   T C $ FLARE,     167
3-D REACTIVITY AND POWER DISTRIBUTION   MSS   360  F4    RS P  CT C $ FLARE,     167
3-D REACTIVITY AND POWER DISTRIBUTION   NEC   635  F4    RS P   T C $ FLARE,     167
3-D STRUCTURAL ANALYSIS     GGA  1108  F5    RS P   T I $ SHELL5, THIN SHELL     452
3-D STRUCTURES   KAPL 6600  F4    RS P X   I $ FINEL, FINITE-ELEMENT STUDY 2,    404
3-D TEMPERATURE DISTRIBUTION PROGRAM     CHI  1108  F4    RS P   T H $ LION,     299
3-D TEMPERATURE DISTRIBUTION PROGRAM     KAPL 6600  F+ASC RS P   T H $ LION4,    299
3-D TRANSIENT HEAT TRANSFER PROGRAM      GEC   635  F+CMP RSBP   T H $ THTE,     346
3-D XENON TRANSIENT & DEPLETION     KAPL 6600  F4    RS P   T D $ 3DXT,DEP3,     477
3-D XYZ XENON OSCILLATION    CENO  360  F4    RS P X T F $ CEXE,INCEXE, 1-GP      415
3-D 2-GROUP DIFFUSION XYZ GEOMETRY  CDC  1604  F63   RS P   T C $ WHIRLAWAY,      32
3-D 2-GROUP DIFFUSION XYZ GEOMETRY  ORNL 7090  F2    RS P   T C $ WHIRLAWAY,      32
3-GEOM    BAPL 6600  F4    RS P   T F $ WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION    274
3-GEOM    GGA  1108  F4    RS P   T F $ WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION    274
3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS  ANL   360  F4    RS P  CT D $     567
3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS  HEDL 1108  F4    RS P   T D $     567
3DDT, 3-D MULTIGROUP DIFFUSION XYZ R-THETA-Z   LASL 6600  F4    RS P   T C $     463
3DXT,DEP3, 3-D XENON TRANSIENT & DEPLETION     KAPL 6600  F4    RS P   T D $     477
3D-GP ENDF/B SCAT KERNELS     DP    360  BCD   R   LX T Z $ THERMOS LIBRARY,     543
32-472DEGF BAPL 6600  F4    RS      T H $ WATER, STEAM TABLES 14.5-14,500PSIA    267
36F   RS PL CT F $ QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE ANL  3600      474
36F   RSBP   T M $ MERMC2,MAGIC, MC**2 LIBRARY SERVICE ROUTINES   ANL  3600      472
360  BAL    RS     CT P $ SLACMON 2.2, OS360 MVT/MFT PERFORMANCE MONITOR  SLAC   635
360  BAL    RSB     T P $ NRTS-RJE, OS/360 MVT REMOTE JOB ENTRY SYSTEM   ANC    519
360  BAL+F  RS P   CT P $ GETCOR,FREECOR, FORTRAN DYNAMIC STORAGE ALLOC  ORNL   644
360  BCD    R    LX T Z $ THERMOS LIBRARY, 30-GP ENDF/B SCAT KERNELS     DP     543
360  COBOL  RS P       M $ AEC-ALO FAU, RADIO FREQUENCY MANAGEMENT SYSTEM ALCO  587
360  COBOL  RSBP   CT M $ BECOM, AEC DP PURCHASE VERSUS LEASE ANALYSIS   SLA    589
360  F+ASM  RSB    CT P $ WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG  ANL    541
360  F+BAL   S      T M $ JOSHUA, DATA STORAGE, RETRIEVAL, AND DISPLAY   DP     490
360  F+BAL   S    X T B $ RAHAB, JOSHUA SYSTEM LATTICE PHYSICS MODULES   DP     536
360  F+BAL  R B L   T P $ TSO-SPEAKEASY, LANGUAGE PROCESSOR UNDER TSO    ANL    593
360  F+BAL  RS      T P $ AMDLIBF, ARGONNE SUBROUTINE LIBRARY CAT. F     ANL    563
360  F+BAL  RS      T P $ FIGS, IBM360&2250 FORTRAN GRAPHICS SUBROUTINES AI     484
360  F+BAL  RS      T P $ NFTS ENVIRONMENTAL ROUTINES, FORTRAN UTILITIES ANC    613
360  F+BAL  RS     CT P $ PROCLOOK, USER PROGRAM PERFORMANCE MONITOR     SLAC   642
360  F+BAL  RS P       D $ ISOSEARCH, ISOTOPE PRODUCTION FLUX, X-SEC CALC ORNL   322
360  F+BAL  RS P    T A $ COMNUC,CASCADE, COMPOUND NUCLEUS REACTION      AI     482
360  F+BAL  RS P    T C $ CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM   AAEC   103
360  F+BAL  RS P    T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM   ANL    209
360  F+BAL  RS P    T D $ CINDER,M0102, POINT DEPLETION FISSION PRODUCT  DP     313
360  F+BAL  RS P    T E $ AIRCS2A, SIMULATION OF REACTOR DYNAMICS        AI     326
360  F+BAL  RS P    T I $ SAFE-3D, 3-D COMPOSITE STRUCTURE STRESS STUDY  ORNL   332
360  F+BAL  RS P   CT B $ U3R, UNRESOL RESONANCE XSEC PROBABILITY TABLES AI     553
360  F+BAL  RS P   CT H $ 6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS    EI     636
360  F+BAL  RS P   CT M $ ARC-SYSTEM, SYSTEM SUBPROGRAMS AND MODULES     ANL    522
360  F+BAL  RS P X T B $ HWUCR-SAFE, 2-D MONTE CARLO CELL CALCULATION    AI     307
360  F+BAL  RS P XCT B $ HAMMER,LITHE,HELP, CRITICAL ANALYSIS SYSTEM     DP     277
360  F+BAL  RSB L CT M $ SCORE3, SCISRS ENDF/B GRAPHIC X-SEC EVALUATION  AI     375
360  F+BAL  RSBPL CT C $ ESP, MONTE CARLO REACTOR ANALYSIS CALCULATION   ORNL   523
360  F+BAL  RSBPL CT C $ KENO, MONTE CARLO MULTIGROUP CRITICALITY CODE   ORNL   450
360  F+BAL  RSBPL CT D $ REBUS2, FUEL CYCLE ANALYSIS FOR FAST REACTORS   ANL    634
360  F+BAL  RSBPL CT G $ PARET, WATER-COOLED CORE TRANSIENT ANALYSIS     ANC    555
360  F+C+R  RSBP    T M $ RALCRTPH, RESOURCE ALLOCATION PROJECT PLANNING MLMO   603
360  F+P+A  RS      T P $ AMDLIBAE, ARGONNE SUBROUTINE LIBRARY CAT. A-E  ANL    562
360  F+P+A  RS      T P $ AMDLIBGZ, ARGONNE SUBROUTINE LIBRARY CAT. G-Z  ANL    564
360  F+P+A  RSBP XCT W $ GAUSS6, BATCH ANALYSIS OF GAMMA-RAY SPECTRA     ANC    622
360  F4     RS        M $ MERMC2, MC**2 BINARY LIBRARY TAPE MAINTENANCE   ANL    472
360  F4     RS      T M $ RIGEL, ENDF/B V3 DATA PROCESSING CODE           ANL    571
360  F4     RS   L  T C $ FIRE5, 1-D AGE-DIFFUSION SLAB CYLINDER SPHERE   AEB      9
360  F4     RS P      A $ CODILLI, LEAST SQUARES ANALYSIS RESONANCE DATA  UILL   347
360  F4     RS P      A $ POLLA, CONVERTS R-MATRIX RESONANCE PARAMETERS   ORNL   639
360  F4     RS P      A $ PSEUDO, STATISTICAL RESONANCE PARAMETER CALC    ENEA   292
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360	F4	RS	P		B	$	WELWING, MATERIAL BUCKLING CYL FUEL ELEMENTS	AEB	362
360	F4	RS	P		C	$	PERT, 1-D PERTURBATION FOR AIM AND FCG CODES	BHSC	30
360	F4	RS	P		D	$	NPRFCCP, FUEL CYCLE COSTS PERFORMANCE DATA	ANL	146
360	F4	RS	P		F	$	AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK	AEB	121
360	F4	RS	P		E	$	BLAST, REACTOR KINETICS TEMPERATURE DIST STUDY	AEB	363
360	F4	RS	P		E	$	R101, SPACE-INDEPENDENT KINETICS KEX OPTIONS	ANL	255
360	F4	RS	P		E	$	R102, SPACE-INDEPENDENT INVERSE KINETICS CALC	ANL	168
360	F4	RS	P		E	$	TRIFIDO, PULSED NEUTRON SOURCE DATA ANALYSIS	CNEA	489
360	F4	RS	P		F	$	TWIGGLE, 2-D 2-GP SPACE-TIME DIFFUSION	ANL	338
360	F4	RS	P		G	$	CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD	DP	47
360	F4	RS	P		G	$	EGAD, CALC OF EXTERNAL GAMMA DOSE INTEGRALS	DP	600
360	F4	RS	P		G	$	INTEG,INSPEC, MARKOV SIMULATION OF REACTOR OPN	DP	590
360	F4	RS	P		G	$	SODCOL2, SODIUM-FUEL INTERACTION ANALYSIS	ANL	521
360	F4	RS	P		G	$	WATER-HAMMER, LIQUID BLOWDOWN ANALYSIS LOFT	UGA	278
360	F4	RS	P		H	$	FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW	MSS	246
360	F4	RS	P		H	$	PLENUM, FLOW DIST. IN CYL COOLANT INLET PLENUM	DP	586
360	F4	RS	P		L	$	GENRO, FREE-FORMAT CARD INPUT PROCESSOR	LASL	530
360	F4	RS	P		O	$	ALPHA-M, RESOLUTION OF GAMMA RAY SPECTRA	ORNL	413
360	F4	RS	P		O	$	CORGAM, UNFOLDING OF COMPLEX GAMMA-RAY SPECTRA	KSUN	390
360	F4	RS	P		O	$	DYNC1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	ANL	464
360	F4	RS	P		P	$	KEELE, LINEARLY-CONSTRAINED OPTIMIZATION	ORNL	556
360	F4	RS	P		U	$	DYNAMIC ANALYSIS OF GASES BY MASS SPECTROMETRY	RFD	645
360	F4	RS	P		W	$	MMM3, COORDINATE ANALYSES SEMI-RIGID MOLECULES	ANC	632
360	F4	RS	P		X	$	TOKMINA/TOKMINA2, TOKAMAK FUSION REACTOR STUDY	ANL	561
360	F4	RS	P	T	A	$	ATHENA4, INELASTIC SCATTERING FORM FACTORS	ORNL	417
360	F4	RS	P	T	B	$	CLUP77, SQUARE CELL COLLISION PROBABILITY CALC	ANL	526
360	F4	RS	P	T	B	$	RICE, PRIMARY RECOIL ATOM SPECTRA ENDF/B DATA	ORNL	453
360	F4	RS	P	T	B	$	SUPERTOG, ENDF/B FINE-GP CONSTANTS GENERATION	ORNL	431
360	F4	RS	P	T	C	$	EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM	ORNL	156
360	F4	RS	P	T	C	$	FAIMCS, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	BHSC	120
360	F4	RS	P	T	C	$	KEFF,MGBS,TGAN, NUCLEAR CRITICALITY SAFETY	DP	617
360	F4	RS	P	T	C	$	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	UMCC	212
360	F4	RS	P	T	D	$	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	CWE	354
360	F4	RS	P	T	E	$	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	ANL	486
360	F4	RS	P	T	F	$	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	400
360	F4	RS	P	T	F	$	TSN, SPATIALLY-DEPENDENT REACTOR KINETICS	AI	309
360	F4	RS	P	T	G	$	AISITE2, PARAMETRIC SITE REQUIREMENT STUDY	AI	172
360	F4	RS	P	T	G	$	HAA3, COAGULATION OF HETEROGENEOUS AEROSOLS	AI	443
360	F4	RS	P	T	G	$	SOFIRE2, SODIUM POOL FIRE 1- & 2-CELL ANALYSIS	AI	559
360	F4	RS	P	T	H	$	ASTEM, THERMODYNAMIC PROPERTIES WATER & STEAM	ANC	580
360	F4	RS	P	T	H	$	HEATING3, 1,2, OR 3-D HEAT CONDUCTION PROGRAM	ORNL	517
360	F4	RS	P	T	H	$	ORRIBLE, ROD BUNDLE FLOW & TEMPERATURE DIST.	ORNL	629
360	F4	RS	P	T	I	$	CYGRO3, OXIDE FUEL ROD STRESS & DEFORMATION	TVA	449
360	F4	RS	P	T	I	$	LIFE1, FAST REACTOR FUEL ELEMENT BEHAVIOR	ANL	460
360	F4	RS	P	T	I	$	SABOR4, DISCRETE-ELEMENT ANALYSIS THIN SHELLS	MIT	402
360	F4	RS	P	T	I	$	SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD	SR	282
360	F4	RS	P	T	M	$	CRECT,CHECKER, ENDF/B V2 PROCESSING CODES	ANL	475
360	F4	RS	P	T	N	$	PLOT-3D, 3-D PLOTS ON IBM2280 OR CALCOMP780	ANL	544
360	F4	RS	P	T	O	$	GROUP2, GROUP THEORY OF LATTICE DYNAMICS	ANL	620
360	F4	RS	P	T	O	$	RESPOND, DISSIMILAR MEDIA TLD CORRECTION CALC	AI	566
360	F4	RS	P	C	G	$	STEFEG, ANALYSIS OF PWR & BWR GASEOUS RELEASE	ORNL	583
360	F4	RS	P	CT	A	$	JUPITOR1, COUPLED CHANNEL X-SEC EVALUATION	ENEA	308
360	F4	RS	P	CT	B	$	MC**2, ENDF MULTIGROUP X-SECTION CALCULATION	ANL	355
360	F4	RS	P	CT	C	$	FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION	MSS	167
360	F4	RS	P	CT	D	$	GEM, ANALYSIS OF NUCLEAR FUEL CYCLE ECONOMICS	UICS	576
360	F4	RS	P	CT	D	$	3DB, 3-D MULTIGROUP DIFFUSION BURNUP ANALYSIS	ANL	567
360	F4	RS	P	CT	F	$	REXCO-H, 2-D HYDRODYNAM RESPONSE TO EXCURSION	ANL	550
360	F4	RS	P	CT	F	$	REXCO-H2, 2-D HYDRODYNAM RESPONSE TO EXCURSION	ANL	615
360	F4	RS	P	CT	G	$	EMERALD, PWR PLANT RADIATION RELEASE & DOSE	PGE	546
360	F4	RS	P	CT	I	$	PSA2, STRESS ANALYSIS MULTIANCHOR PIPE SYSTEM	AI	542
360	F4	RS	P	CT	M	$	ETOE, ENDF/B TO MC**2 DATA CONVERSION	ANL	350
360	F4	RS	P	CT	W	$	MACS LATTICE VIBRATION NEUTRON SCATTRING CODES	ANC	574
360	F4	RS	P	CT	W	$	MSCAT, SLOW NEUTRON MULTIPLE SCATTERING CALC	ANL	575
360	F4	RS	P	X	G	$	BURST1, HYDRODYNAMIC ANALYSIS DURING BLOWDOWN	PPCO	435

360	F4	RS	P	X	T	E	$	MOD5, STOCHASTIC MODEL OF NEUTRON SLOWING-DOWN	NPGS	491
360	F4	RS	P	X	T	F	$	CEXE,INCFXE, 1-GP 3-D XYZ XENON OSCILLATION	CENO	415
360	F4	RS	P	X	T	F	$	FORE2, FAST REACTOR EXCURSION CALCULATIONS	ANL	174
360	F4	RS	P	X	T	H	$	ORTHIS,ORTHAT, 2-DIMENSIONAL HEAT CONDUCTION	ORNL	525
360	F4	RS	P	X	T	P	$	DF/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS	SLA	640
360	F4	RS	P	X	T	P	$	FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,....	ANL	610
360	F4	RS	P	XCT	F		$	TASK, 1-D MULTIGROUP REACTOR KINETICS PROGRAM	ORNL	558
360	F4	RS	P	XCT	F		$	VENUS, 2-D LMFBR POWER EXCURSION DISASSEMBLY	ANL	511
360	F4	RS	PL	T	B		$	TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS	BHSC	50
360	F4	RS	PL	CT	B		$	INCITF, THERMAL SPECTRA & MULTI-GP CONSTANTS	ANC	565
360	F4	RS	PL	CT	F		$	QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE	ANL	474
360	F4	RS	PL	CT	M		$	ERREST, LOCA ROD BUNDLE CHF DATA ANALYSIS	ANC	518
360	F4	RS	PLX	T	B		$	AILMCE, X-SECTION CALC ELASTIC SCAT RESONANCES	AI	147
360	F4	RS	PLX	T	B		$	HRG3, SLOWING-DOWN SPECTRUM, MULTIGP CONSTANTS	TVA	467
360	F4	RS	PLX	T	B		$	XSDRN, DISCRETE ORDINATE MULTIGROUP CONSTANTS	ORNL	393
360	F4	RS	PLXCT	B			$	LEOPARD, SPECTRA CALCULATION WITH DEPLETION	WAPD	279
360	F4	RS	PLXCT	B			$	PHROC, MULTI-GP CONSTANT & FAST SPECTRA CALC	ANC	520
360	F4	RSB	XCT	P			$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE	ANL	534
360	F4	RSB	L	T	M		$	CLIP, FORM OR THREDES LIBRARY UTILITY ROUTINE	AI	271
360	F4	RSBP			P		$	GRAPH, LINEAR REGRESSION W/CONFIDENCE LIMITS	BKC	624
360	F4	RSBP			P		$	HISTOGRAMS, QUALITY CONTROL SAMPLE STATISTICS	BKC	614
360	F4	RSBP		T	K		$	THREDES, 1-D FEW-GP DIFFUSION DESIGN SYSTEM	AI	273
360	F4	RSBP	C		P		$	LATIN SQ, NXN LATIN SQUARE EXPERIMENTAL DESIGN	MLMO	630
360	F4	RSBP	CT	C			$	ARC-DIF1D, 1-D MULTI-GP DIFFUSION & INVENTORY	ANL	626
360	F4	RSBP	CT	C			$	MONA, 1-D MULTIGROUP DIFFUSION SLAB, CYL, SPH	ANC	582
360	F4	RSBP	CT	C			$	TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM	LASL	608
360	F4	RSBP	CT	D			$	DWARF, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM	ANC	579
360	F4	RSBP	CT	G			$	FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION	MA-G	448
360	F4	RSBP	CT	G			$	PREP,KITT, SYSTEM FAULT TREE EVALUATION CODES	ANC	528
360	F4	RSBP	CT	G			$	RSAC, RADIOLOGICAL SAFETY ANALYSIS PROGRAM	ANC	265
360	F4	RSBP	CT	I			$	FPFM, STEADY-STATE FISSION PRODUCT FUEL MODEL	ANC	584
360	F4	RSBP	CT	I			$	STRAP, STATIC & DYNAMIC STRUCTURAL ANALYSIS	ANC	539
360	F4	RSBP	CT	J			$	VIEWPIN, VIEW FACTOR CALC FOR CYLINDRICAL PINS	ANC	569
360	F4	RSBP	CT	L			$	ARC-NU1002, BCD INPUT DATA PROCESSING MODULE	ANL	533
360	F4	RSBP	CT	Q			$	ISOTAB, PU POWER OUTPUT FROM MIXED ISOTOPES	MLMO	619
360	F4	RSBP	X	T	D		$	SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION	AI	58
360	F4	RSBP	X	T	G		$	THETA1-B, FUEL ROD THERMAL RESPONSE LOCA	ANC	512
360	F4	RSBP	XCT	B			$	XLACS, XSDRN MULTIGROUP LIBRARIES FROM ENDF/B	ORNL	572
360	F4	RSBP	XCT	G			$	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	369
360	F4	RSBP	XCT	H			$	MOXY, BWR FUEL ELEMENT HEAT TRANSFER CALC	ANC	551
360	F4	RSBP	XCT	W			$	GAUSS5, ANALYSIS OF GAMMA-RAY SPECTRA GE(LI)	ANC	605
360	F4	RSBPL	CT	C			$	RAFFLE-ANC, MONTE CARLO NEUTRON TRANSPORT CODE	ANC	631
360	F4	RSBPL	CT	C			$	VARI-1D, 1-D VARIATIONAL SENSITIVITY	ANL	625
360	F4	RSBPL	CT	C			$	VIM1X, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS	AI-A	510
360	F4	RSBPL	CT	L			$	ARC-XSEC1, MICROSCOPIC X-SECTION MANIPULATION	ANL	594
360	F4	RSBPLX	T	C			$	ANISN, 1-D MULTI-GP DISCRETE ORDINATE CALC	AI	151
360	F4	RSBPLX	T	C			$	CAESAR4,LIBLST, 1-D MULTI-GP DIFFUSION + LIB	AI	270
360	F4	RSBPLXCT	B				$	LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE	TVA	249
360	F4	RSBPLXCT	C				$	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE	MTS	262
360	PL1	RS	P		T	P	$	PTAC11, 2-PASS ASSEMBLER FOR THE PDP-11 ON 360	ANC	516
360	ANC	360	PL1		RS	P		T P $ PTAC11, 2-PASS ASSEMBLER FOR THE PDP-11 ON		516
360A	F+BAL	RS	P		T	D	$	PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	IBM	336
360B	BAL	RSB		X	T	P	$	COPYCAT, IBM OS SYSTEM CATALOG UTILITY ROUTINE	ANL	646
360B	EBCDC	R	L		T	Z	$	GAMTAB, RADIOACTIVE-DECAY GAMMA RAY CATALOG	DP	637
360B	F+ASM	RSB		CT	P		$	WSP-HASP/DOS, DOS-MFT REMOTE WORKSTATION PKG	ANL	541
360B	F+BAL	RS	P			O	$	PMS1, FAST NEUTRON POLARIZATION EXPERIMENT	UCND	469
360B	F+BAL	RS	P		T	B	$	RAFFLE, 1ST FLIGHT COLLISION PROBABILITIES MC	ORNL	392
360B	F+BAL	RSBP			T	D	$	PDQ5, 2-D FEW-GROUP DIFFUSION AND DEPLETION	MIT	336
360B	F+BAL	RSBP		CT	C		$	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE	DP	450
360B	F+BAL	RSBP		CT	G		$	CONTEMPT-LT/022, PRESSURE-TEMPERATURE RESPONSE	ANC	433
360B	F4	RS			T	H	$	STEAM-67, 1967 ASME STEAM AND WATER PROPERTIES	BG&E	487
360B	F4	RS	P			I	$	NUBOW, STRUCTURAL ANALYSIS BOWED REACTOR CORES	ANL	643
360B	F4	RS	P		T	D	$	ORCOST, POWER PLANT CAPITAL COST ESTIMATING	ORNL	588
360B	F4	RS	P	C		P	$	GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER	ANL	592

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360B F4     RS P   CT I $ SAP4, STRUCTURAL ANALYSIS OF LINEAR SYSTEMS     ANL     641
360B F4     RS P XCT A $ FLANGE2(71-1), ENDF/B THERMAL SCATTERING DATA   DP      368
360B F4     RS PL CT M $ EDITOR, ENDF/B TAPE PROCESSING AND EDITING      ORNL    502
360B F4     RSBP   CT C $ HERESY3, 2-D HETEROGENEOUS REACTOR CALCULATION DP      136
360C F+BAL RSBPLXCT G $ RELAP4, TRANSIENT THERMAL-HYDRAULIC ANALYSIS     ANC     369
360C F4     RS P   T H $ COBRA3C, ROD BUNDLE THERMAL-HYDRAULIC ANALYSIS  BNW     432
360C F4     RS P XCT D $ CONCEPT3, POWER PLANT CONCEPTUAL COST ESTIMATE  ORNL    498
360D F4     RSBP   CT C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL    358
360F F+BAL RS P XCT D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION     ANC     275
360H F4     RS P    T K $ CITATION, 1,2,3-D DIFFUSION DEPLETION MULTIGP  ORNL    387
3600  ASAF4 RS P    T M $ ETOE, ENDF/B TO MC**2 DATA CONVERSION          APDA    350
3600  F36     SBP       I $ BOW2, DEFLECTION CALCULATION PARALLEL BEAMS   ANL     365
3600  F36     RS P      G $ DISPER, AEROSOL PARTICLE TRANSPORT STUDY      RFD     554
3600  F36     RS P    T B $ MC**2, ENDF MULTIGROUP X-SECTION CALCULATION  ANL     355
3600  F36     RS P    T C $ SNARG-1D, 1-D MULTI-GP DISCRETE ORDINATE CALC ANL     288
3600  F36     RS P    T I $ SUPORAN, REACTOR CORE SUPPORT STRESS ANALYSIS ANL     357
3600  F36     RS P    T S $ TOODY2, 2-D LAGRANGIAN EQNS OF MOTION SOLUTION SLA    627
3600  F36     RS P X T C $ MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE ANL     262
3600  F36     RS P XCT C $ TESS, 1-D SLAB AND SPHERE GEOM SN TRANSPORT    ANL     513
3600  F36     RSBP      A $ MISH-MASH, RESONANCE INTEGRAL CALC HOMOGENEOUS ANL    214
3600  F36     RSBP      G $ CHEMLOC2, CORE HEATING CLADDING-STEAM REACTION ANL    366
3600  F36     RSBP      I $ SWELL2, FUEL ELEMENT LIFETIME ANALYSIS        ANL     353
3600  F36     RSBP X T B $ RABBLE,WLIR,FLAT, RESONANCE ABSORPTION, CELL   ANL     281
3600  F36     RSBP X T B $ RIFF-RAFF, RESONANCE INTEGRAL CALC 2-REG CELL  ANL     213
3600  F4      RSBP    T D $ 2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION   ANL     325
3600  F63     RS   LX T B $ GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC    ANL      33
3600  F63     RSBP      A $ NEARREX, COMPOUND NUCLEUS X-SECTION CALC      ANL     171
3600  F63     RSBP      E $ R1C1, SPACE-INDEPENDENT KINETICS KEX OPTIONS  ANL     255
3600  F63     RSBP      E $ R1C2, SPACE-INDEPENDENT INVERSE KINETICS CALC ANL     168
3600  F63     RSBP      F $ AX1, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE  CDC     102
3600  F63     RSBP      O $ COINC, COINCIDENCE COUNTING DATA REDUCTION    ANL     248
3600  F63     RSBP    T A $ 2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS ANL     254
3600  F63     RSBP    T C $ FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION  CDC     167
3600  F63     RSBP    T E $ TRAFICORPORATION, TRANSFER FUNCTION SYNTHESIS ANL     135
3600  F63     RSBP    T G $ R153, PARAMETRIC SITE REQUIREMENT STUDY       ANL     172
3600  F63     RSBP    T H $ ARCUS, TRANSIENT TEMPERATURE CALC CYLINDER    ANL     152
3600  F63     RSBP    T M $ XLIBIT, X-SECTION LIBRARY UTILITY ROUTINE     ANL     181
3600  F63     RSBP XCT B $ THERMOS(ANL), THERMAL SPECTRUM X-SECTION CALC  ANL     184
3600  F63     RSBPL   T J $ MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY   ANL     143
3600  36F     RS PL CT F $ QX1, QUASISTATIC SPATIAL REACTOR KINETICS CODE ANL     474
3600  36F     RSBP    T M $ MERMC2,MAGIC, MC**2 LIBRARY SERVICE ROUTINES  ANL     472
360CB F36     RSBP      G $ WHAM, LIQUID-FILLED PIPING SYSTEM ANALYSIS    KE      278
370  F4     RS P    T F $ GAKIN2, 1D MULTIGROUP TIME-DEPENDENT DIFFUSION MIT     310
370  F4     RS PL CT C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE   OSUC     29
370  F4     RS PLXCT B $ FORM, FAST NEUTRON SPECTRUM X-SECTION CALC     OSUC     51
4RESTRAINT PIPE STRESS, MAXIMUM MOMENT CALC    AI    7090  F+FAP RS    T I $  109
48 GAFGAR ENDF/B DATA TAPES    GGA  1108  BIN   R   L  T Z $ ZPR-III ASSEMBLY  356
500PSIA 32-472DEGF BAPL 6600  F4    RS     T H $ WATER, STEAM TABLES 14.5-14,  267
6KILER, CORE HEATUP CODE FOR BWR/6 ANALYSIS    FI    360  F+BAL RS P  CT H $  636
625  F+MAP RS P    T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM  BC      209
625  F4     RS       T C $ EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM BC      156
625  F4     RS       T C $ FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE BC      2
625  F4     RS P      B $ AVOID, ANNULAR VOID X-SECTION CALCULATION      GEC     276
625  F4     RS PLX T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV    BC      189
635  F+FAP RSBP    T Q $ CASCADE,CLUSTER, RADIATION DAMAGE IN METALS   GEC     419
635  F+GMP RS      T P $ GENED ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. NEC     51
635  F+GMP RS P    T D $ SYN, 2D SYNTHESIS MULTIGP DIFF & 1GP DEPLETION NED     49
635  F+GMP RS P XCT B $ ENDRUN2, MULTIGROUP CONSTANTS FROM ENDF/B DATA GESV    50
635  F+GMP RS P XCT L $ TOOWK, SPATIAL & COMPOSITION-DEPENDENT X-SECS   GESV    50
635  F+GMP RSBP    T H $ THTF, 3-D TRANSIENT HEAT TRANSFER PROGRAM     GEC     34
635  F4     RS       G $ ANVENT, LOCA ANALYSIS DUKE POWER MCGUIRE UNITS DUCO    52
635  F4     RS    X T P $ EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE ANL    53
635  F4     RS P      D $ RAPFL, FUEL CYCLE PARAMETERS FAST BREEDERS      NED     37
635  F4     RS P    T B $ REAX, RESOLVED RESONANCE EPITHERMAL X-SECTIONS NED     25
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635										6600		
635	F4	RS	P		T	C	$	DOT2DB, 2-D MULTIGROUP DIFFUSION & SN THEORY		NED		459
635	F4	RS	P		T	C	$	FLARE, 3-D REACTIVITY AND POWER DISTRIBUTION		NED		167
635	F4	RS	P		T	D	$	FUMBLE, FAST REACTOR FUEL BURNUP & MANAGEMENT		NED		480
635	F4	RS	P		T	G	$	FREADM1, FAST REACTOR CORE ACCIDENT ANALYSIS		NED		479
635	F4	RS	P		T	H	$	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS		NED		256
635	F4	RS	P		T	H	$	VELVET2, TURBULENT FLOW IN LMFBR ROD BUNDLE		NED		458
635	F4	RS	P		T	M	$	TROUT, MUG MULTIGROUP XSEC LIBRARY MAINTENANCE		NED		493
635	F4	RS	P		T	O	$	BURNUP, HEAVY ELEMENT ISOTOPIC BURNUP ANALYSIS		NEC		311
635	F4	RS	P		T	O	$	EXPN, ANALYSIS OF PULSED NEUTRON SOURCE DATA		NED		258
635	F4	RS	P	CT	I		$	BEHAVE2, OXIDE FUEL PERFORMANCE FINITE-ELEMENT		GESV		568
635	F4	RS	P	X T	F		$	FORE2, FAST REACTOR EXCURSION CALCULATIONS		NED		174
635	F4	RS	PL		T	C	$	BISYN, 2-D MULTI-GP DIFFUSION SYNTHESIS CALC		NED		287
635	F4	RSBP				D	$	CHAINS, ANALYSIS OF RADIOACTIVE DECAY CHAINS		GEC		418
635	F4	RSBP				D	$	DOS, NEUTRON FLUX-DOSIMETER ACTIVITY RELATION		GEC		423
635	F4	RSBP				O	$	MICHRD, MICROHARDNESS MEASUREMENT ANALYSIS		GEC		421
635	F4	RSBP			T	B	$	GROUSE, SPACE-DEPENDENT X-SECTION GENERATION		GEC		420
6400	F4	S	P			H	$	PWR-PPM, BORATION-DILUTION TABLES FOR PWR OPN		CPPD		552
6400	F4	RS	P			G	$	FRCRL2, LOCA FISSION PRODUCT RELEASE ANALYSIS		BCL		500
6400	F4	RS	P		T	F	$	ADEP, 1D AND 2D FEW-GROUP SPACE-TIME KINETICS		BCL		494
6400	F4	RS	P		T	G	$	ECCSA4, LOSS-OF-COOLANT & EMERGENCY COOLING		BCL		330
6400	F4	RS	P		T	G	$	NUPLOC-1.0, LOSS-OF-COOLANT THERMAL ANALYSIS		BCL		328
6400	F4	RS	P	X		G	$	MIRAB,MIRAP, CONTAINMENT SYSTEM IODINE REMOVAL		BCL		499
6400	F4	RS	P	X T	G		$	MUCHA1,MUCHA2, MULTIPLE CHANNEL ANALYSIS ECC		BCL		508
6400	F4	RS	PLX	T	B		$	GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV		UVA		185
6500	F4	RS	P			B	$	PARTI, OPTIMAL GROUP OR MESH COLLAPSING		TRW		416
6500	F4	RS	PLX	T	C		$	MACH1, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE		PURD		262
6600		RSBPLX		T	B		$	LECPARD, SPECTRA CALCULATION WITH DEPLETION		AERI		279
6600	BCD	R	L	T	Z		$	ETOG1 DATA LIBRARIES, MUFT4 OR 5, GAM1 OR 2		WAPD		447
6600	BCD	R	LX	T	Z		$	LASL XSEC SETS, SN 18- 24- AND 25-GROUP SETS		LASL		532
6600	F+ASC	RS				P	$	SIMPLE1, TIME-SHARING PROGRAMMING LANGUAGE		KAPL		442
6600	F+ASC	RS	P		T	H	$	LION4, 3-D TEMPERATURE DISTRIBUTION PROGRAM		KAPL		299
6600	F+ASC	RS	P		T	I	$	GEM, EIGENVALUE PROBLEM FOR VIBRATING SYSTEMS		KAPL		344
6600	F+ASC	RS	P		T	J	$	ASFIS, GAMMA RAY SOURCE BUILDUP FACTOR CALC		BAPL		429
6600	F+ASC	RS	P		T	P	$	CURFIT, CURVE FITTING EXPERIMENTAL DATA POINTS		KAPL		43
6600	F+ASC	RS	P		T	P	$	DATATRAN UTILITY MODULES, 2-D + 3-D PLOTTING		KAPL		407
6600	F+ASC	RS	P		T	P	$	DOGGY, DESK CALCULATOR FORM SHEET OP PACKAGE		KAPL		428
6600	F+ASC	RS	P		T	P	$	LIZARD, NONLINEAR DIFFERENTIAL EQNS. SOLUTION		KAPL		445
6600	F+ASC	RS	P		T	P	$	SNEC, NONLINEAR ALGEBRAIC EQN SOLN CURVE PLOT		KAPL		364
6600	F+ASC	RS	P	X T	B		$	RESQ2,RESQD,DBF1, RESONANCE INTEGRAL HEX CELL		BAPL		285
6600	F+COM	RS			T	P	$	KAPLPLOT, KAPL CALCOMP PLOTTING ROUTINES		KAPL		496
6600	F+COM	RS	P			H	$	HYMAS, HYDRODYNAMIC MASS MATRIX GENERATION		BAPL		560
6600	F+COM	RS	P		T	I	$	DUZZ, 2-D AXISYMMETRIC & PLANE ELASTIC-PLASTIC		BAPL		503
6600	F+COM	RS	P		T	I	$	GAPL3, INELASTIC LARGE DEFLECTION STRESS STUDY		BAPL		397
6600	F+COM	RS	P		T	P	$	LENSDES, NONLINEAR LEAST SQ LENS DESIGN SYSTEM		LASL		602
6600	F+COM	RS	P		T	Q	$	INDX, XRAY DIFFRACTION POWDER PATTERN INDEXING		LASL		609
6600	F+COM	RS	P	X T	B		$	PAX03, HARMONY-PDQ X-SECTION GENERATION CODE		BAPL		426
6600	F+COM	RS	P	X T	D		$	FARED, 1-D FAST REACTOR DESIGN & SURVEY STUDY		BW		427
6600	F+COM	RS	P	X T	I		$	MATLS, 3-D FINITE ELEMENT ELASTIC ANALYSIS		BAPL		597
6600	F+COM	RS	PLX	T	C		$	KENO2, MONTE CARLO MULTIGROUP CRITICALITY CODE		RFD		450
6600	FTN	RS	P		T	I	$	CHILES, LINEAR ELASTIC SINGULARITY MODELING		SLA		611
6600	F4	RS				B	$	APREFX1, 99-GP DLC-2B LIBRARY GROUP COLLAPSING		APRF		466
6600	F4	RS				I	$	SCRSDB, PRESSURE VESSEL STRESS AND FATIGUE		KAPL		391
6600	F4	RS			T	B	$	MO807, 2-D DIFFUSION ABSORPTION REMOVAL X-SECS		BAPL		280
6600	F4	RS			T	C	$	MO648, 1-D SLAB TRANSPORT WITH SLOWING DOWN		BAPL		342
6600	F4	RS			T	H	$	WATER, STEAM TABLES 14.5-14,500PSIA 32-472DEGF		BAPL		267
6600	F4	RS			T	I	$	CYGRO2, STRESS ANALYSIS CYL FUEL ELEMENT		BAPL		266
6600	F4	RS			T	M	$	CHECK3,RIGFL3, ENDF/B V3 PROCESSING CODES		BNL		571
6600	F4	RS			T	O	$	GASPAN, COMPLEX GAMMA-RAY SPECTRA ANALYSIS		KAPL		485
6600	F4	RS		X	T	P	$	EISPACK, MATRIX EIGENVALUE EIGENVECTOR PACKAGE		ANL		534
6600	F4	RS	L		T	B	$	GAMBIT, X-SEC GENERATION FOR TRANSPORT CODES		WANL		547
6600	F4	RS	L		T	B	$	GGC4, MULTI-GP X-SECTIONS FAST THERMAL SPECTRA		GGA		298
6600	F4	RS	P			A	$	AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC		BNL		376
6600	F4	RS	P			A	$	BESFIT, DIFFRACTION MODEL ELASTIC SCAT X-SEC		BNL		524
6600	F4	RS	P			A	$	CLEM, ANGULAR DISTRIBUTION LEGENDRE FITTING		KAPL		531

6600	F4	RS	P		A	$	GRAMP, R-M PARAMETERS OF UNRESOLVED RESONANCES	BAPL	470
6600	F4	RS	P		A	$	MULTI, MULTI-LEVEL RESONANCE THEORY XSEC CALC	KAPL	535
6600	F4	RS	P		A	$	RAMF1, REICH-MOORE RESOLVED REGION X-SECTIONS	BNL	492
6600	F4	RS	P		A	$	SIGPLOT, RESOLVED MULTILEVEL B-W X-SEC CALC	BNL	377
6600	F4	RS	P		A	$	THRESH, STATISTICAL MODEL REACTION X-SECTIONS	BNL	504
6600	F4	RS	P		D	$	CINDER,MO102, POINT DEPLETION FISSION PRODUCT	BAPL	313
6600	F4	RS	P		D	$	NPRFCCP, FUEL CYCLE COSTS PERFORMANCE DATA	UEC	146
6600	F4	RS	P		D	$	POWERCC, NUCLEAR STATION ELECTRICITY COSTS	UEC	340
6600	F4	RS	P		D	$	WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY	UEC	224
6600	F4	RS	P		F	$	RAUMZEIT, 1-D TIME-DEPENDENT DIFFUSION CALC	KAPL	352
6600	F4	RS	P		F	$	STINT3, SINGLE-CHANNEL SPACE-TIME SYNTHESIS	KAPL	389
6600	F4	RS	P		H	$	RAPP, HIGH-VELOCITY FLOW STUDY STEAM-WATER MIX	KAPL	382
6600	F4	RS	P		I	$	STEM, MATRIX GENERATION FOR A SYSTEM OF BEAMS	KAPL	337
6600	F4	RS	P		I	$	STRIPE, FUEL ROD CLAD STRAIN & PELLET CRACKING	BAPL	570
6600	F4	RS	P		I	$	TCBU1, CREEP-BUCKLING OF TUBES UNDER PRESSURE	BAPL	604
6600	F4	RS	P		I	$	TUBE, U-TUBE HEAT EXCHANGER STRESS ANALYSIS	KAPL	378
6600	F4	RS	P		L	$	GENRD, FREE-FORMAT CARD INPUT PROCESSOR	LASL	530
6600	F4	RS	P		N	$	DAC1, SN PERTURBATION CODE USING DTF4 FLUXES	LASL	455
6600	F4	RS	P		N	$	HEATMESH, GEOMETRICAL DATA HEAT TRANSFER STUDY	SLL	434
6600	F4	RS	P		N	$	LARCA, FLUX-WEIGHTING OF DTF4 CROSS SECTIONS	LASL	409
6600	F4	RS	P		O	$	DYNO1, PHOTOMULTIPLIER ELECTRON DISTRIBUTION	KAPL	464
6600	F4	RS	P		P	$	BH99, EXTREME VALUE DISTRIBUTION DATA ANALYSIS	BAPL	621
6600	F4	RS	P		P	$	ERF,ERFC, ERROR & COMPLEMENTARY ERROR FUNCTION	SLA	601
6600	F4	RS	P		P	$	FORSIM, SOLN OF SYSTEM OF ORDINARY DIFF EQNS	CRNL	514
6600	F4	RS	P		P	$	MOST, A MULTIDIMENSIONAL OPTIMIZATION SCHEME	KAPL	446
6600	F4	RS	P		P	$	PLOTR, 2D CONTOUR PLOTS & AREA CALCULATION	SLA	578
6600	F4	RS	P		P	$	RELO1, RELIABILITY FOR A SINGLE FAILURE MODE	BAPL	497
6600	F4	RS	P		P	$	ROPE, FINDING ROOTS OF A POLYNOMIAL	KAPL	444
6600	F4	RS	P		V	$	FFEARS, LAPLACE EQUATION ISOTROPIC DIELECTRICS	SLA	577
6600	F4	RS	P	T	A	$	JP1XR, COUPLED-CHANNEL SCATTERING X-SEC CALC	KAPL	506
6600	F4	RS	P	T	A	$	PHASER, PHASE SHIFT X-SEC & POLARIZATION CALC	KAPL	507
6600	F4	RS	P	T	A	$	PUN1, UNRESOLVED RESONANCE INTEGRALS X-SECS	BAPL	359
6600	F4	RS	P	T	A	$	SUMOR, S-WAVE NEUTRON X-SECTION CALCULATION	BAPL	399
6600	F4	RS	P	T	A	$	TCR, THERMAL SCATTERING CRYSTALLINE MATERIALS	LASL	360
6600	F4	RS	P	T	B	$	EPOCH, NEUTRON AGE CALCULATION OF ENDF/B DATA	BAPL	461
6600	F4	RS	P	T	B	$	ETOM1, ENDF/B FORMAT TO MUFT FORMAT X-SECTIONS	WAPD	436
6600	F4	RS	P	T	B	$	GLEN, GROUP CONSTANT CALC FROM TOR OUTPUT DATA	LASL	361
6600	F4	RS	P	T	C	$	BE21, FEW-GP DISCRETE ORDINATES SLAB GEOMETRY	BAPL	398
6600	F4	RS	P	T	C	$	DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM	LASL	209
6600	F4	RS	P	T	C	$	EXTERMINATOR2, 2-D MULTI-GP DIFFUSION PROGRAM	CE	156
6600	F4	RS	P	T	C	$	TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM	LASL	608
6600	F4	RS	P	T	C	$	VARI-QUIR, TIME-DEP 2-D MULTI-GP DIFFUSION	WANL	212
6600	F4	RS	P	T	C	$	3DCT, 3-D MULTIGROUP DIFFUSION XYZ R-THETA-Z	LASL	463
6600	F4	RS	P	T	D	$	CINCAS, NUCLEAR FUEL CYCLE COST AND ECONOMICS	WAPD	354
6600	F4	RS	P	T	D	$	PHENIX, 2D DIFFUSION BURNUP REFUELING HISTORY	LASL	454
6600	F4	RS	P	T	D	$	2DB, 2-D MULTIGROUP DIFFUSION AND DEPLETION	LASL	325
6600	F4	RS	P	T	D	$	3DXT,DEP3, 3-D XENON TRANSIENT & DEPLETION	KAPL	477
6600	F4	RS	P	T	E	$	ANCON, SPACE-INDEPENDENT REACTOR KINETICS CODE	LASL	486
6600	F4	RS	P	T	F	$	NOAH, 1-D ONE-GP SPACE-TIME DIFFUSION FEEDBACK	BNL	405
6600	F4	RS	P	T	F	$	NOWIG, 1-D 2-GP KINETICS TEMPERATURE FEEDBACK	BAPL	371
6600	F4	RS	P	T	F	$	SAS1A, FAST REACTOR POWER AND FLOW TRANSIENTS	ANL	400
6600	F4	RS	P	T	F	$	TWIGL, 2-D 2-GP SPACE-TIME DIFFUSION FEEDBACK	BAPL	338
6600	F4	RS	P	T	F	$	WIGL2, 1-D 2-GP SPACE-TIME DIFFUSION 3-GEOM	BAPL	274
6600	F4	RS	P	T	G	$	FLASH3, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	295
6600	F4	RS	P	T	G	$	FLASH4, FULLY-IMPLICIT TRANSIENT SIMULATION	BAPL	448
6600	F4	RS	P	T	G	$	MO555,ACT1, LOSS-OF-COOLANT ACCIDENT ANALYSIS	BAPL	284
6600	F4	RS	P	T	G	$	RELAP3, REACTOR BLOWDOWN - EXCURSION ANALYSIS	ANC	369
6600	F4	RS	P	T	H	$	CHIC-KIN, FAST + INTERMEDIATE POWER TRANSIENTS	BAPL	473
6600	F4	RS	P	T	H	$	FIGRO, LWBR FUEL SWELLING TEMPERATURE STUDY	BAPL	272
6600	F4	RS	P	T	H	$	FLOT1,MO219, PWR FLOW TRANSIENT ANALYSIS	BAPL	331
6600	F4	RS	P	T	H	$	GLUB1, WATER-LOGGED FUEL ELEMENT ANALYSIS	BAPL	429
6600	F4	RS	P	T	H	$	HAFMAT, SYSTEM STEADY-STATE FLOW DISTRIBUTION	KAPL	614
6600	F4	RS	P	T	H	$	HOT2, 2-D TRANSIENT HEAT CONDUCTION PROGRAM	BAPL	280
6600	F4	RS	P	T	H	$	MANTA, STEADY-STATE THERMAL-HYDRAULIC ANALYSIS	WARD	250

6600 7044

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6600  F4     RS P    T H $ M0899,FCH, STEAM TABLES 14.5-2538 PSIA          BAPL  294
6600  F4     RS P    T H $ TOPS, TRANSIENT THERMODYNAMICS OF PRESSURIZERS  BAPL  348
6600  F4     RS P    T H $ WASP, WATER AND STEAM THERMODYNAMIC PROPERTIES  BAPL  396
6600  F4     RS P    T I $ BUBL1, FUEL SWELLING & GAS RELEASE SIMULATION   BAPL  468
6600  F4     RS P    T I $ BUSHL, CYL SHELL BUCKLING COLLAPSE ANALYSIS     BAPL  481
6600  F4     RS P    T I $ CYGR03, OXIDE FUEL ROD STRESS & DEFORMATION     BAPL  449
6600  F4     RS P    T I $ FUCIT, DYNAMIC RESPONSE OF ELASTIC STRUCTURES   BAPL  537
6600  F4     RS P    T I $ M0266, LINEAR ELASTIC STRUCTURAL DYNAMICS       BAPL  383
6600  F4     RS P    T I $ M0457,PIPE, ELASTIC STRESS OF PIPING SYSTEM     BAPL  329
6600  F4     RS P    T I $ M0552, DYNAMIC ANALYSIS LINEAR ELASTIC SYSTEMS  BAPL  283
6600  F4     RS P    T I $ PELEN, FUEL PELLET TEMPERATURE & DEFORMATION    BAPL  598
6600  F4     RS P    T I $ SAFE-PLANE, PLANE STRESS ANALYSIS, 2-D BODIES   BNL  252
6600  F4     RS P    T I $ SEALSHELL2, SHELL STRESS ANALYSIS AXISYM LOAD   BAPL  282
6600  F4     RS P    T I $ SLADE-D, DYNAMIC ANALYSIS OF THIN SHELLS        SLA  581
6600  F4     RS P    T J $ M0756,LETC, 1-D SLAB GAMMA-RAY TRANSPORT        BAPL  343
6600  F4     RS P    T L $ BL47, DRAFTING TOOL TO PLOT PLANE STRUCTURES    BAPL  373
6600  F4     RS P    T L $ OMESH,RENUM, SELF-ORGANIZING MESH GENERATION    SLA  612
6600  F4     RS P    T M $ EDITOR, ENDF/B TAPE PROCESSING AND EDITING      ORNL  502
6600  F4     RS P    T M $ SHLOG, DATA MANAGEMENT, EDITING, & ANALYSIS     BAPL  557
6600  F4     RS P    T O $ BETTY, ENTRAINED PARTICLES SAMPLING STUDY       BAPL  545
6600  F4     RS P    T O $ JITER, FLUCTUATION EXPERIMENT ANALYSIS          BAPL  394
6600  F4     RS P    T O $ REDUX, REACTOR FLUCTUATION EXPERIMENT ANALYSIS  BAPL  425
6600  F4     RS P    T P $ DAFT1, LEAST SQUARES FIT FISSILE NUCLIDE DATA   BAPL  327
6600  F4     RS P    T P $ M0661,M0657,M0626, POLYNOMIAL CURVE FITTING     BAPL  411
6600  F4     RS P    T Q $ GROUP2, GROUP THEORY OF LATTICE DYNAMICS        LASL  620
6600  F4     RS P X    I $ FINEL, FINITE-ELEMENT STUDY 2,3-D STRUCTURES    KAPL  404
6600  F4     RS P X T P $ DE/STEP,INTRP, SOLN OF ORDINARY DIFF EQUATIONS   SLA  640
6600  F4     RS P X T P $ FUNPACK, SPECIAL FUNCTION ROUTINES-EI,K,E,.... ANL  610
6600  F4     RS PL   T B $ ETOG1, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT WAPD  437
6600A F+ASC  RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BAPL  478
6600A F+ASC  RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BAPL  275
6600B F+ASC  R       T L $ DATATRAN 2-D GEOMETRY INPUT, PREPARATION, EDIT KAPL  406
6600B F+ASC  R       T P $ DATATRAN UTILITY MODULES, 2-D & 3-D PLOTTING   KAPL  407
6600B F+ASC  RS      T P $ BETTIS ENVIRONMENTAL ROUTINES, SUBROUTINE LIB. BW  478
6600B F+ASC  RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BW  275
6600B F+ASC  RS P    T J $ SPAN4, A POINT-KERNEL SHIELD EVALUATION CODE   BAPL  462
6600B F+ASC  RSB   X T M $ TIGIR2, MODULAR DOCUMENT INFORMATION SYSTEM    KAPL  403
6600B F+COM  R       T M $ DATATRAN, MODULAR PROGRAMMING AND DATA SYSTEM  KAPL  386
6600B F+COM  RS      T P $ LASLIB, LOS ALAMOS SUBROUTINE LIBRARY ROUTINES LASL  633
6600B FTN    RS P    T P $ SETS, SET EQUATION TRANSFORMATION SYSTEM       SLA  623
6600B F4     RS      T M $ CHECKER,CRECT,DAMMET,PLOTFB,... ENDF/B V1 PROC BNL  384
6600B F4     RS      T M $ CRECT,CHECKER,RIGEL,PLOTFB,... ENDF/B V2 PROC  BNL  475
6600B F4     RS      T M $ RIGEL4,CHECK4,... ENDF/B V4 PROCESSING CODES   BNL  638
6600B F4     RS P      P $ GEAR, ORDINARY DIFFERENTIAL EQN SYSTEM SOLVER  LLL  592
6600B F4     RS P    T A $ RESEND,ADLER, ENDF/B RESONANCE XSECTION CODES  BNL  465
6600B F4     RS P    T I $ MANE1, RECTANGULAR MAGNETIC NETWORK SOLUTION   BAPL  412
6600B F4     RS P    T I $ SEAL SHELL, SHELL STRESS ANALYSIS AXISYM LOAD  WTSC  282
6600C F+ASC  RS P    T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BAPL  275
6600C F+COM  RS      T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.2 CDC  478
6600C F4     RS P    T H $ COBRA3C, ROD BUNDLE THERMAL-HYDRALLIC ANALYSIS BNW  432
6600C F4     RS P    T I $ SOR3, STRESS ANALYSIS SHELLS OF REVOLUTION     KAPL  80
6600D F+ASC  R B     T D $ PDQ7, 1,2 OR 3-D FEW-GP DIFFUSION DEPLETION    BCS  275
6600D F+COM  RS      T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE3.3 CDC  478
6600D F4     RS P    T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL  358
7030  F4     RS      T H $ RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS    LASL  242
7030  F4     RS P    T C $ DTF4, 1-D MULTI-GP DISCRETE ORDINATE PROGRAM   LASL  209
7030  F4     RS P    T D $ DTF-BURN, 1-D MULTI-GP DTF4 WITH DEPLETION     LASL  269
7040  F+MAP  RS P      A $ COMBCO, COMBINED B-W MULTI-LEVEL CONVOLUTION   PPCO  203
7040  F4     RS P    T C $ TOFIC, 1-D FEW-GP SN APPROXIMATION CYLINDER    PPCO  148
7044  F+MAP  RS P    T B $ GARCL, RESONANCE OVERLAP AND LATTICE EFFECTS   GGA  219
7044  F+MAP  RS P    T D $ OPLS, POWER PLANT PERFORMANCE AND PRICE STUDY  GGA  226
7044  F+MAP  RS P    T H $ BLOCST5, POINT-KINETICS WITH 2-D HEAT TRANSFER GGA  205
7044  F+MAP  RS P    T H $ TOODEE, 2-D TIME-DEPENDENT HEAT CONDUCTION     PPCO  349
7044  F+MAP  RSBP      M $ UNPACK, RETRIEVAL FROM SCISRS X-SECTION TAPE   GGA  206
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7044 7090

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7044  F+MAP RSBP   T C $ GAMBLE4, 2-D MULTI-GP DIFFUSION XY RZ GEOMETRY GGA     222
7044  F+SPS RSBP   T N $ CROSSPLOT, SC4020 PLOTS FROM X-SECTION TAPES   GGA     207
7044  F4    RS       I $ CORE, CORE CONFIGURATION FUEL TEMPERATURE CODE GGA     233
7044  F4    RS   X T G $ PRECON, HTGR CONTAINMENT PRESSURE POST RUPTURE GGA     228
7044  F4    RS P     D $ RAD2, HTGR FISSION PRODUCT ACTIVITY DIST STUDY GGA     231
7044  F4    RS P     D $ WAMPUM, FUEL CYCLE COSTS PERFORMANCE STUDY     GGA     224
7044  F4    RS P     I $ GAZELLE5, GAS-COOLED CORE THERMAL DESIGN STUDY GGA     232
7044  F4    RS P     L $ GAVER, ENERGY INTERVAL X-SECTION AVERAGING     GGA     218
7044  F4    RS P   T B $ FMC-N, MONTE CARLO CALC NEUTRON HISTORIES      GGA     195
7044  F4    RS P   T C $ GASP2, 1-D FEW-GP DIFFUSION POWER DIST SEARCH  GGA     220
7044  F4    RS P   T C $ TEMCO, 1-D FEW-GP DIFFUSION TEMP COEF CALC     GGA     225
7044  F4    RS P   T D $ GARGOYLE, FUEL CYCLE ANALYSIS PARTIAL REFUEL   GGA     260
7044  F4    RS P   T D $ RELOAD-FEVER, 1-D FEW-GP DIFFUSION DEPLETION   GGA     221
7044  F4    RS P   T D $ REVISED-GAD, FUEL CYCLE ANALYSIS W/REFUELING   GGA     223
7044  F4    RS P   T D $ STMGEN, STEAM GENERATOR DESIGN CRITERIA COSTS  GGA     227
7044  F4    RS P   T G $ ELBOW, FUEL ELEMENT STRESS ANALYSIS STUDY      GGA     229
7044  F4    RS P   T I $ SAFE-AXISYM, STRESS ANALYSIS AXISYMMETRIC LOAD GGA     251
7044  F4    RS P X   A $ LEGCOEF3, LEGENDRE COEF CALC FOR ANGULAR DIST GGA     217
7044  F4    RSBP  CT I $ SAFE-PORS, STRESS ANALYSIS AXISYMMETRIC LOAD  GGA     250
709  F2    RS        C $ FIRN, 2-D FEW-GP S4 APPROXIMATION RZ GEOMETRY  LLL       7
7090  F+FAP RS       T I $ 4RESTRAINT PIPE STRESS, MAXIMUM MOMENT CALC   AI     109
7090  F+FAP RS  L    T B $ QUICKIE, INFINITE MEDIUM SPECTRUM X-SECTIONS  AI     119
7090  F+FAP RS  L    T C $ FAIM, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  AI     120
7090  F+FAP RS  L    T C $ ULCER, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE AI     118
7090  F+FAP RS P       I $ WIREX, COMPUTER-PRODUCED WIRING LISTS LHTREX  LASL   315
7090  F+FAP RS P     T B $ SCPHIST1/2/5, MULTI-GP TRANSFER COEFFICIENTS  LLL     160
7090  F+FAP RS P     T C $ EXTERMINATOR, 2-D MULTI-GP DIFFUSION PROGRAM  ORNL    156
7090  F+FAP RS P     T D $ ASSAULT, 2-D MULTI-GP DIFFUSION DEPLETION CODE ORNL   240
7090  F+FAP RS P     T L $ DPC, DATA PREPARATION FOR 2-D DESIGN PROGRAMS LASL    234
7090  F+FAP RS P     T M $ DFSR, DATA FILE SERVICE ROUTINES ENDF TAPES   BNL     236
7090  F+FAP RS PL    T B $ GAMTEC2, MULTI-GP CONSTANT CALC 0 TO 10 MEV   BNW     185
7090  F+FAP RS PL    T B $ TEMPEST2, THERMAL NEUTRON SPECTRUM X-SECTIONS AI       50
7090  F+FAP RS PL    T C $ AIM6, 1-D MULTI-GP DIFFUSION SLAB CYL SPHERE  AI       29
7090  F+FAP RSB      T A $ TUZ, UNRESOLVED REGION RESONANCE INTEGRAL CALC GGA     42
7090  F+FAP RSB      T A $ ZUT, RESOLVED REGION RESONANCE INTEGRAL CALC  GGA      41
7090  F+FAP RSBP     T D $ DDB, 2-D FEW-GP DIFFUSION BURNUP RZ GEOMETRY  GGA      99
7090  F+FAP RSBPL    T C $ CRAM, 1-D AND 2-D MULTI-GP DIFFUSION PROGRAM  UK-R     103
7090  F+FAP RSBPLX   T B $ AGN-GAM, FAST SPECTRUM MULTI-GP CONSTANT CALC AGC     204
7090  F+MAP RS P     T C $ TDSN, 2-D MULTIGROUP DISCRETE ORDINATE PROGRAM LER     312
7090  FAP   RSBP  X T Q $ SPECTRA, MC CALCULATION IRRADIATED MATERIAL    GEC     422
7090  FLCCO RS P       B $ MCS, MONTE CARLO NEUTRON PENETRATION STUDY    LASL    202
7090  FLCCO RS P       B $ ZCT, GROUP-COLLAPSING OF MULTI-GP X-SECTIONS  LASL    113
7090  FLCCO RSBP       C $ 2DXY, 2-D MULTI-GP SN APPROXIMATION XY GEOM   AGC      18
7090  FLCCO RSBP     T C $ GE-HAPC-S13, 1-D MULTI-GP DOUBLE SN APPROX    BNW       7
7090  F2    RS         A $ LYNNE, WOODS-SAXON POTENTIAL SHAPE CALCULATION ORNL     38
7090  F2    RS         B $ DANCOFF JR, MODERATOR SPACE CHORD DIST FUNCT    AEG      15
7090  F2    RS         B $ S4 CYL CELL CODE, 1-D 1-GP S4 APPROXIMATION     AI        5
7090  F2    RS         C $ PERT, 1-D PERTURBATION FOR AIM AND FOG CODES    AI        3
7090  F2    RS         E $ AIREK3, SPACE-INDEPENDENT KINETICS W/FEEDBACK   AI       12
7090  F2    RS         F $ SNAPKIN5/5A, 1-REGION KINETICS SNAP GEOMETRY    AI       12
7090  F2    RS         I $ CROCK, SPACE POWER PLANT DESIGN OPTIMIZATION    AI       11
7090  F2    RS         I $ HUGUE, STEADY-STATE TEMPERATURE VOID FRACTION   AI        4
7090  F2    RS         I $ SHOCK, SPACE POWER PLANT DESIGN OPTIMIZATION    AI       11
7090  F2    RS         J $ FARSE1A, DOSE RATE FROM SNAP SHIELD LEAKAGE     AI        9
7090  F2    RS         J $ MORTIMER, DOSE RATE CALCULATION SNAP GEOMETRY   AI       14
7090  F2    RS         J $ SCARF2, SCATTER FROM RADIATOR FINS SNAP GEOM    AI       11
7090  F2    RS         J $ SCAR1, SCATTER FROM A RING SNAP GEOMETRY        AI       11
7090  F2    RS         N $ WED, W-DSN OUTPUT TAPE EDIT REACTION RATES      UK-W     13
7090  F2    RS       T A $ SUMMIT, CRYSTALLINE SCATTERING KERNEL CALC      GGA       5
7090  F2    RS  L    T D $ SIZZLE, 1-D MULTIGROUP DIFFUSION DEPLETION      AI        5
7090  F2    RS P       B $ BAM, S4 CYL CELL CODE AND TEMPEST COMBINATION   AI       10
7090  F2    RS P       B $ BOUNCE, FLUX DIST IN MULTI-PIN FUEL ELEMENT     AGC      23
7090  F2    RS P       B $ SAIL, 1-D 1-GP SN APPROXIMATION SLAB GEOMETRY   AI        5
7090  F2    RS P       C $ MIST, 1-D FEW-GP SN DOUBLE SN APPROX SLAB GEOM  PPCC      5
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7090	F2	RS	P		D	$	AIMFIRE, URANIUM FUEL CYCLE COST ANALYSIS	AI	55
7090	F2	RS	P		F	$	CONEC, COUPLED NEUTRONICS-HYDRODYNAMICS SPHERE	LLL	129
7090	F2	RS	P		G	$	CLOUD, GAMMA-RAY DOSE RATE FROM A CLOUD	AI	47
7090	F2	RS	P		J	$	GRACE1, GAMMA-RAY ATTENUATION SLAB GEOMETRY	AI	45
7090	F2	RS	P		J	$	GRACE2, GAMMA-RAY ATTENUATION CYL SPHERE GEOM	AI	46
7090	F2	RS	P		J	$	RATRAP, DOSE RATE CALCULATION SNAP GEOMETRY	AI	141
7090	F2	RS	P		O	$	CROC90, ML-1 FLUID FLOW EXPERIMENT ANALYSIS	AGC	154
7090	F2	RS	P		P	$	FRANTIC, LEAST SQUARES FIT SUM OF EXPONENTIALS	MIT	324
7090	F2	RS	P	T	B	$	AGN-SIGMA, CALC OF MULTI-GP TRANSFER MATRICES	AGC	243
7090	F2	RS	P	T	C	$	EQUIPOISE3, 2-D 2-GROUP DIFFUSION SLAB CYL	ORNL	39
7090	F2	RS	P	T	C	$	EQUIPOISE3A, 2-D 2-GP DIFFUSION CYLINDER SLAB	ORNL	87
7090	F2	RS	P	T	C	$	FOG, 1-D FEW-GP DIFFUSION SLAB CYLINDER SPHERE	AI	28
7090	F2	RS	P	T	C	$	TOPIC, 1-D FEW-GP SN APPROXIMATION CYLINDER	PPCC	148
7090	F2	RS	P	T	C	$	W-DSN, 1-D MULTI-GP SN APPROX SLAB CYL SPHERE	UK-W	132
7090	F2	RS	P	T	C	$	WHIRLAWAY, 3-D 2-GROUP DIFFUSION XYZ GEOMETRY	ORNL	32
7090	F2	RS	P	T	C	$	2OGRAND, 2-D FEW-GROUP DIFFUSION SLAB CYLINDER	ORNL	40
7090	F2	RS	PL	T	A	$	ARES2, RESONANCE INTEGRAL X-SECTION CALC	AI	89
7090	F2	RS	PL	T	B	$	FORM, FAST NEUTRON SPECTRUM X-SECTION CALC	AI	51
7090	F2	RS	PLX	T	B	$	GAM1, FAST NEUTRON SPECTRUM X-SECTION CALC	GGA	33
7090	F2	RS	PLX	T	C	$	DTF2, 1-D MULTI-GP DISCRETE ORDINATE CALC	AI	151
7090	F2	RSB			F	$	HATCHET, COUPLED NEUTRONICS-HYDRODYNAMICS CODE	AGC	153
7090	F2	RSB		T	D	$	FEVER, 1-D FEW-GP DIFFUSION DEPLETION PROGRAM	GGA	117
7090	F2	RSBP			D	$	ISOCRUNCH, REACTION DECAY CHAIN ANALYSIS	ORNL	180
7090	F2	RSBP			D	$	NUCY, SOLUTION OF NUCLIDE CHAIN EQUATIONS	ORNL	134
7090	F2	RSBP			J	$	LIPRECAN1, MC NEUTRON PENETRATION CALCULATION	DAC	123
7090	F2	RSBPL		T	J	$	MAC, SHIELD DESIGN MULTIGROUP SLAB GEOMETRY	BNW	143
7090	F4	RS	P	T	F	$	NOISY1, AUTO- AND CROSS-SPECTRAL DENSITIES	BNW	488
7090	F4	RSBP			A	$	MUFFLE, FISSILE NUCLIDE X-SECTION EVALUATION	ORNL	323
7090	MAD	RSB			O	$	BURP1, DETECTOR EFFICIENCY POINT SOURCE	MTS	164
7090	MAD	RSB			O	$	BURP2, DETECTOR EFFICIENCY DISK SOURCE	MTS	165
7090	MAD	RSB			O	$	BURP3, DETECTOR EFFICIENCY POINT SOURCE	MTS	166
7090	MAD	RSB			O	$	BURP4, GAMMA-RAY PHOTOFRACTION SOLID CRYSTAL	MTS	169
7090	MAD	RSB			O	$	BURP5, GAMMA-RAY PHOTOFRACTION WELL CRYSTAL	MTS	170
7094	F+FAP	RS	L	T	M	$	MOMUS, X-SECTION LIBRARY UTILITY PROGRAM	AI	159
7094	F+FAP	RS	P		J	$	SHOE, SHIELD WEIGHT OPTIMIZATION DOSE CALC	AI	197
7094	F+FAP	RS	P	T	B	$	EPITHERMOS, SPECTRUM AND X-SECTION CALCULATION	NED	201
7094	F+FAP	RS	P	T	G	$	AISITE2, PARAMETRIC SITE REQUIREMENT STUDY	AI	172
7094	F+FAP	RS	P	T	H	$	HEATING2, TRANSIENT STEADY-STATE HEAT TRANSFER	AI	198
7094	F+FAP	RS	PL	T	B	$	AILMOE, X-SECTION CALC ELASTIC SCAT RESONANCES	AI	147
7094	F+FAP	RS	PL	T	B	$	GRAVE, GROUP-AVERAGING X-SECTIONS PARAMETERS	AI	162
7094	F+FAP	RS	PL	T	B	$	TYCHE3, MONTE CARLO SLOWING-DOWN DENSITY CALC	AI	149
7094	F+FAP	RS	PL	T	G	$	CUPIE,DOSE,THUNDERHEAD, EXTERNAL+INTERNAL DOSE	AI	196
7094	F+FAP	RS	PL	T	M	$	ECSIL, EXPERIMENTAL NEUTRON DATA LIBRARY	LLL	351
7094	F+FAP	RSBPL		T	N	$	CPS, SC4020 PLOTS FROM SCISRS X-SECTION TAPES	WANL	239
7094	F+MAP	RS	P		A	$	CHAD, LEGENDRE COEF CALC FOR ANGULAR DIST DATA	AI	215
7094	F+MAP	RS	P	T	B	$	GAROL, RESONANCE OVERLAP AND LATTICE EFFECTS	LER	219
7094	F+MAP	RS	P	T	E	$	AIPOS, SPACE-INDEPENDENT KINETICS W/FEEDBACK	AI	163
7094	F+MAP	RS	P	T	F	$	TSN, SPATIALLY-DEPENDENT REACTOR KINETICS	AI	309
7094	F+MAP	RS	PLX	T	A	$	TRIX1, RESONANCE INTEGRAL X-SECTION CALC	AI	205
7094	F+MAP	RS	PLX	T	B	$	LASER, SPECTRUM CALC WITH BURNUP CYL LATTICE	WAPD	249
7094	F+MAP	RSBP		T	G	$	SATURATED BLOWDOWN2, BLOWDOWN ANALYSIS LOFT	KE	200
7094	FAP	RS	P	T	H	$	RATH, 2- OR 3-D HEAT CONDUCTION LUMPED MASS	LASL	242
7094	F2	RS	P		A	$	EXT, X-SECTIONS FROM B-W RESONANCE PARAMETERS	WANL	238
7094	F2	RS	P		F	$	WEAK EXPLOSION, COUPLED NEUTRON-HYDRODYNAMICS	APDA	145
7094	F2	RS	P		H	$	FLOW-MODEL, MULTI-CHANNEL 2-D 2-PHASE FLOW	AI	246
7094	F2	RS	P		P	$	EXPALS, LEAST SQUARES EXPONENTIAL DECAY CURVES	LLL	321
7094	F2	RS	P	T	A	$	2PLUS, NON-SPHERICAL OPTICAL MODEL X-SECTIONS	AI	254
7094	F2	RS	P	T	G	$	TRANS-FUGUE1, TRANSIENT FLOW AND HEAT TRANSFER	AI	268
7094	F2	RS	PL	T	I	$	CYCLOPS1, THERMODYNAMIC CYCLE ANALYSIS	AI	244
7094	F2	RSBP			H	$	AXFLU, HEAT TRANSFER MOLTEN FUEL TUBE BUNDLES	LASL	182
7094	F2	RSBP			H	$	AXTHRM, HEAT TRANSFER SOLID FUEL TUBE BUNDLES	LASL	183
7094	F2	RSBP		T	H	$	PTH1, BLOWDOWN PRESSURE TEMPERATURE HISTORY	KE	155
7094	F4	RS			E	$	R102, SPACE-INDEPENDENT INVERSE KINETICS CALC	WANL	168
7094	F4	RS		T	P	$	LASL LEAST SQUARES, GENERAL CURVE FITTING	LASL	62

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7094                                                                    99-GP

7094  F4     RS P      A $ AVERAGE, UNRESOLVED REGION AVERAGE X-SEC CALC  BNL     376
7094  F4     RS P      F $ MARS, 2-D EXCURSION CALCULATION R-Z GEOMETRY   APDA    293
7094  F4     RS P X T C $ VARI-QUIR3, 2-D MULTI-GP DIFFUSION XY RZ RTH   WANL    264
71-1), ENDF/B THERMAL SCATTERING DATA  DP    360B F4    RS P XCT A $ FLANGE2(   368
7600  F4     RS P    T B $ ETCG3, ENDF/B TO MUFT, GAM, ANISN X-SEC FORMAT WAPD  538
7600  F4     RS P    T B $ ETCT2, THERMAL LIBRARIES FROM ENDF/B DATA      WAPD  509
7600  F4     RS P    T B $ ETCT3, ENDF/B V3 DATA TO THERMAL LIBRARY FORM  WAPD  628
7600  F4     RS P    T C $ TRIPLET, 2-D TRIANGULAR MESH TRANSPORT PROGRAM LASL  608
7600  F4     RS P    T G $ CEBUG, STEAM GENERATOR SODIUM-WATER REACTION   CEND  548
7600  F4     RS PLX T C $ VIM1, MONTE CARLO CRITICAL ASSEMBLY ANALYSIS   AI    510
760CB F4     RS      T P $ MODEL, MODIFIED BETTIS ENVIRNMNTL LIB SCOPE2.0 CEND  478
7600D F4     RS P    T C $ TWOTRAN2, 2-D MULTI-GP TRANSPORT XY RZ RTHETA  LASL  358
99-GP DLC-2B LIBRARY GROUP COLLAPSING  APRF 6600  F4    RS       B $ APRFX1,    466
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