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FCFTR — A Computer Code to Convert
Standard CCCC Interface Files to FTR Files

by

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FCFTR - A Computer Code to Convert Standard CCCC Interface

Files to FTR Files

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ABSTRACT

The FCFTR code has been developed to permit translation of ISOTXS and BRKOXS files of the CCCC interface system to FTR files. The code is written in ANSI FORTRAN and is operational on the CDC 7600.

I. INTRODUCTION

FCFTR is a computer code for converting neutron multigroup data libraries which exist in standard interface CCC files¹. The ISOTXS and BRKOXS files which are produced by MINX² or any other multigroup processing code that produce the above standard CCCC files are converted to FTR³ libraries. The FTR library represents the present input library requirements to the LDX⁴ computer code. Consequently, for those installations which do not have an interfaced form of LDX, the FCFTR code affords additional library flexibility.

II. DISCUSSION

The FCFTR code is a stop-gap measure for those installations which do not have an interfaced version of the LDX code, but wish to employ data which is more current than the distributed FTR library series^{3,5}. Additionally the FCFTR will not be required when the SPHINX⁶ code is released since it represents an improved and interfaced modification of the LDX code.

The FCFTR code operates from a master library which exists in FTR format and to this library additional information from an ISOTXS and BRKOXS file are added. This additional information may be a new isotope or modified isotope multigroups cross section information. Since the FTR format contains both information regarding cross sections and self

shielding factors it is necessary to have an ISOTXS and BRKOXS file. The present version of FCFTR assumes that the two files are on the same I/O unit for a particular isotope and that the ISOTXS and BRKOXS are separated by a file mark. Furthermore FCFTR can input the ISOTXS and BRKOXS in either a binary or BCD standard format. However, FCFTR outputs a binary FTR library. The present version of FCFTR operates only on version II standard interface data, but could easily be converted to process version III standard interfaces. FCFTR was designed to be used primarily with the Los Alamos Scientific Laboratory code MINX, but can be employed on any version II ISOTXS and BRKOXS file.

III. GUIDE TO USER APPLICATION

The FCFTR code requires five (5) input/output units, one of which is card input unit (unit 5) and one which is a printer output unit (unit 6). The remaining units concern the manipulation of data.

Unit 3 - input ISOTXS file followed by BRKOXS file, the two being separated by a file mark (BCD or binary records permitted).

Unit 9 - master tape in FTR format - data will be added to this unit.

Unit 8 - not presently used.

MASTER 1

The user input requirements are minimal as described below.

Card Type 1: 1115

Number of words on card	Name of Variable	COMMENT
1	MODE	= 1 ISOTXS and BRKOXS in binary = 2 ISOTXS and BRKOXS in BCD
2	IADD	= 0 add data to master tape = 1 write FTR tape at beginning of tape
3	NT(1)	Temperature dependence of data to be add = 0 no dependence = 1 temperature dependence
4	NXCMR	Maximum number of downscatter permitted- this should be consistent throughout FTR library
Editing option on input data only		
5	IRD(1)	= 0 no editing = 1 edit ISOTXS and BRKOXS file control information
6	IRD(2)	= 0 no editing = 1 edit ISOTXS and BRKOXS file data information
7	IRD(3)	= 0 no editing = 1 edit the set chi data on ISOTXS and self shielding factors of BRKOXS
8	IRD(4)	= 0 no editing = 1 edit the isotope control information of ISOTXS and the cross section information of BRKOXS
9	IRD(5)	= 0 no editing = 1 edit principal cross sections of ISOTXS
10	IRD(6)	= 0 no editing = 1 edit the isotope chi data of ISOTXS
11	IRD(7)	= 0 no editing = 1 edit the scattering cross sections of ISOTXS

The output information to the FTR library is automatically edited

ACKNOWLEDGMENTS

Thanks to Raphael J. LaBauve for helping in the debugging of subroutines in the FCFTR code.

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6. N. C. Park and C. Duraton, "Studies of Applications of Cross-Section data and Critical Experiment Data to Reactor Design," Westinghouse Advanced Reactor Division Quarterly Progress Report for period ending January 31, 1973, WARD-3045T4B-7 (See also other reports in this series).

LASL IDENTIFICATION: LP-0451

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PROGRAM FCFT(IMP,OUT,PUN,FSET3,FSET5=IMP,FSET6=OUT,FSET7=PUN,
IFSET8,FSET9)
C *****
C CONVERT VERSION TO CCLC ISOTXS FILE AND BRKXS FILE
C TO AN FTR STRUCTURED TAPE FOR USE IN ONEDX
C GROUP 1-1, LOS ALAMOS SCIENTIFIC LABORATORY
C *****
COMMON A(1000)
COMMON/FTR/HULN(1),ATW(1),NT(1),NGB(1),NGE(1),NPFF(4,1),TEM(3,1),
ISF(4,1),H,FF(4,300,1),SR(9,100),SM(100,100),TUN,NKCMR
COMMON/OPTS/MODE,NTYPE,IRD(10)
C *****
C DEFINE I/O UNITS
C
C IUS=3
C IUR=4
C IUG=9
C IUS=5
C IUG=6
C REWIND IUS
C REWIND IUR
C REWIND IUG
C READ INPUT FOR PROBLEM CONTROL
C
C NKCMR IS THE MAXIMUM NO OF DOWNSCATTER
C IF MODE=1 BINARY INPUT, 2 RCD INPUT
C IF IAND=0 ADD DATA ONTO MASTER TAPE
C IF NT(1)=1 TEMPERATURE DEPENDENT DATA
C (RD(1,,10))=1 PRINT OPTIONS
C
C READ(IUS,25)MODE,IAND,NT(1),NKCMR,IMN
10 CALL BISOTX(IUG,IUS,IUR)
C READ(IUS)ENFS
C IF (IUG,IUS)IS,IS
15 CONTINUE
C CALL HRRKX(IUG,IUS,IUR)
C IF (IUG,IUS)CALL SKIP(IUG)
C CALL MAKFTN(IUR,IUG)
C
C LET IT DIE ON AN EOF
C
C STOP
20 FORMAT(14IS)
25 END
C
C SUBROUTINE BISOTX(NSYS,NIN,NDOUT)
C *****
C READ NECESSARY ISOTXS INFORMATION FROM UNIT NIN
C *****
COMMON A(1)
DIMENSION IA(1)
COMMON/OPTS/MODE,NTYPE,IRD(10)
COMMON/FTR/HULN(1),ATW(1),NT(1),NGB(1),NGE(1),NPFF(4,1),TEM(3,1),
ISF(4,1),H,FF(4,300,1),SR(9,100),SM(100,100),TUN,NKCMR
EQUIVALENCE (A(1),IA(1))
DATA TOTAL,ELAS,AINFL,ANP2N,ONTOTAL,OMELASTC,OMINELAS,OM N2N/
DATA M0,M1,INQ,1,1,9/
C
C ---FILE IDENTIFICATION
C
C IREC=1
C NWD=0
C IF (MODE.EQ.1) CALL REED(NIN,IREC,IA(1),NWD,1)
C IF (MODE.EQ.2) READ(NIN,200)(IA(1),I=1,NWD)
C FN=0(1)
C HIFA(2)
C HSEA(1)
C IVER=IA(6)
C WRITE(NSYS,560)FN,IVER,NIN
C WRITE(NSYS,570)MU,MS
C
C ---FILE CONTROL
C
C IREC=IREC+1
C NWD=NWD+1
C IF (MODE.EQ.1) CALL REED(NIN,IREC,IA(1),NWD,1)
C IF (MODE.EQ.2) READ(NIN,220)(IA(1),I=1,NWD)
C NGRN(IP=IA(1))
C NISN=IA(2)
C MARIP=IA(3)
C MARIN=IA(4)
C MARND=IA(5)
C ICNIST=IA(6)
C NCLWAX=IA(7)
C NCHLOK=IA(8)
C NSBLNK=IA(9)
C (M=NUMMUM)
C IF (TUN(1).NE.1) GO TO 10
C WRITE(NSYS,360)(IA(1),I=1,NWD)

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C		FCFTR	86
C	---FILE DATA	FCFTR	87
C		FCFTR	88
10	NWDS=(ICMIST*(1/(NCBLOK)*2)*NGROUP*2*NISO*13	FCFTR	89
	IREF1=IREF1+1	FCFTR	90
	NWR=12*NISO	FCFTR	91
	IF (MODE.EQ.1) CALL REED(NIN,IREF1,A(1),NWDS,1)	FCFTR	92
	IF (MODE.EQ.2) READ(NIN,250)(A(1),I=1,NWR)	FCFTR	93
	WRITE(NSYS,370)(A(1),I=1,12)	FCFTR	94
	WRITE(NSYS,380)	FCFTR	95
	DO 20 I=1,NISO	FCFTR	96
	J=I-12	FCFTR	97
20	WRITE(NSYS,390)I,A(I)	FCFTR	98
	NEXT=13*NISO	FCFTR	99
	IF (NCHLOK.GT.1) GO TO 30	FCFTR	100
	NWR=NEXT+NGROUP	FCFTR	101
	IF (MODE.EQ.2) READ(NIN,260)(A(1),I=NEXT,NWR)	FCFTR	102
	WRITE(NSYS,400)	FCFTR	103
	CALL WUTH(A(NEXT),ICMIST,NGROUP,M1,6H)N GR ,6HOUT GP,M1,NSYS)	FCFTR	104
	NEXT=NEXT+NGROUP	FCFTR	105
30	WRITE(NSYS,410)	FCFTR	106
	NWR=NEXT+NGROUP+NISO	FCFTR	107
	IF (MODE.EQ.2) READ(NIN,260)(A(1),I=NEXT,NWR)	FCFTR	108
	CALL WUTH(A(NEXT),NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	109
	NEXT=NEXT	FCFTR	110
	NEXT=NEXT+NGROUP	FCFTR	111
	WRITE(NSYS,420)	FCFTR	112
	CALL WUTH(A(NEXT),NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	113
	NEXT=NEXT+NGROUP	FCFTR	114
	WRITE(NSYS,430)A(NEXT)	FCFTR	115
	NEXT=NEXT+1	FCFTR	116
	WRITE(NSYS,440)	FCFTR	117
	CALL WUTH(A(NEXT),NISO ,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	118
	NWR=NEXT+NISO-1	FCFTR	119
		FCFTR	120
C			
C	---SFT CHI DATA	FCFTR	121
C		FCFTR	122
40	IF (NCHLOK.EQ.1) GO TO 60	FCFTR	123
	NWDS=((NGROUP-1)/NCHLOK)*ICMIST	FCFTR	124
	NPT=1	FCFTR	125
	DO 50 I=1,NCHLOK	FCFTR	126
	IREF1=IREF1+1	FCFTR	127
	CALL REED(NIN,IREF1,A(NPT),NWDS,1)	FCFTR	128
50	NPT=NPT+NWDS	FCFTR	129
	IF (IWD(3).NE.1) GO TO 60	FCFTR	130
	WRITE(NSYS,450)	FCFTR	131
	CALL WUTH(A(1),ICMIST,NGROUP,M1,6H)N GR ,6HOUT GP,M1,NSYS)	FCFTR	132
		FCFTR	133
C			
C	---ISOTOPE CONTROL AND GROUP INDEPENDENT DATA	FCFTR	134
C		FCFTR	135
60	DO 190 I=1,NISO	FCFTR	136
	NWDS=((NGROUP*2)*NSCMAX*15	FCFTR	137
	IREF1=IREF1+1	FCFTR	138
	IF (MODE.EQ.1) CALL REED(NIN,IREF1,A(1),NWDS,1)	FCFTR	139
	IF (MODE.EQ.2) READ(NIN,280)(A(1),I=1,NWDS)	FCFTR	140
C		FCFTR	141
C	SAVE ATOMIC MALS	FCFTR	142
C		FCFTR	143
	ATM(1)=A(2)	FCFTR	144
	JREAD=1+NWDS	FCFTR	145
	NCI=LR=A(M)	FCFTR	146
	ICM1=A(10)	FCFTR	147
	IFIS=A(110)	FCFTR	148
	1&LF=A(111)	FCFTR	149
	INP=A(112)	FCFTR	150
	IND=A(113)	FCFTR	151
	IND=A(114)	FCFTR	152
	INT=A(115)	FCFTR	153
	IF (IWD(4).NE.1) GO TO 70	FCFTR	154
	WRITE(NSYS,460)	FCFTR	155
	WRITE(NSYS,470)(A(1),I=1,9)	FCFTR	156
	WRITE(NSYS,480)(A(1),I=10,15)	FCFTR	157
	NFI=15	FCFTR	158
	WRITE(NSYS,490)	FCFTR	159
	CALL WUTH(A(NFI),NSCMAX,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	160
	NFI=NFI+NSCMAX+1A	FCFTR	161
	WRITE(NSYS,500)	FCFTR	162
	CALL WUTH(A(NFI),NSCMAX,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	163
	J1=NFI+2*NSCMAX	FCFTR	164
	WRITE(NSYS,510)	FCFTR	165
	CALL WUTH(A(J1),NGROUP,NSCMAX,M1,6H GRP ,6H BLOCK,M1,NSYS)	FCFTR	166
	J1=J1+NGROUP*NSCMAX	FCFTR	167
	WRITE(NSYS,520)	FCFTR	168
	CALL WUTH(A(J1),NGROUP,NSCMAX,M1,6H GRP ,6H BLOCK,M1,NSYS)	FCFTR	169
C		FCFTR	170

```

C      ---PRINCIPAL CROSS SECTIONS
C
70    NWDS=(+IFIS*(ICHI*(1/NCIRLK)+2)*IALF*INP*IN2N*IND*INT)*NGROUP
      IREC1=IREC1+1
      NWR=NWDS*JREAD-1
      IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(JREAD),NWDS,1)
      IF (MODE.EQ.2) READ(NIN,300)(A(I),I=JREAD,NWR)
      NKIND=NWDS/NGROUP
      CALL FTRSH(A(JREAD),NGROUP,NKIND,IFIS,IALF,INP,IN2N)
      IF (IRD(5).NE.1) GO TO 80
      WRITE(NSYS,530)
      NKIND=NWDS/NGROUP
      CALL WOT(A(JREAD),NGROUP,NKIND,M1,6M GROUP,6M TYPE ,M1,NSYS)
C
C      ---ISOTOPE CHI DATA
C
80    IF (NCIBLK.EQ.1) GO TO 100
      IF (IFIS.LT.1) GO TO 100
      IF (ICHI.LT.1) GO TO 100
      NWDS=(NGROUP-1)/NCIBLK+1*ICHI
      NPT=JREAD
      DO 90 N=1,NCIBLK
        IREC1=IREC1+1
        NWR=NPT*NWDS-1
        IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(NPT),NWDS,1)
        IF (MODE.EQ.2) READ(NIN,320)(A(I),I=NPT,NWR)
        NPT=NPT+NWDS
        IF (IRD(6).NE.1) GO TO 100
        WRITE(NSYS,540)
        CALL WOT(A(JREAD),ICHI,NGROUP,M1,6M IN OP ,6M OUT OP,M1,NSYS)
C
C      ---SCATTERING CROSS SECTIONS
C
100   DO 190 N=1,NSCHMAX
        K=N-1
        IDSCY=IA(K)
        K=N+NSCHMAX
        LORDN=IA(K)
        IDSCY=IDSCY/100+1
        GO TO (110,120,130,140), IDSCY
110   HLOCK=TOTAL
        GO TO 150
120   HLOCK=ELAS
        GO TO 150
130   HLOCK=ATNEL
        GO TO 150
140   HLOCK=AN2N
150   IF (LORDN.NE.0) GO TO 160
        WRITE(NSYS,550)N,HLOCK
        GO TO 190
160   KMAX=0
        K=2*NSCHMAX+15*(N-1)*NGROUP
        INC=(NGROUP-1)/NSHLOCK+1
        NPT=JREAD
        WRITE(NSYS,560) HLOCK
        DO 180 J=1,NSHLOCK
          JL=(J-1)*INC+1
          JU=J+INC
          NWDS=1
          DO 170 JJ=JL,JU
            LK=JJ
            NWDS=NWDS+IA(L)
            KMAX=KMAX+IA(L)
            NWDS=NWDS+LORDN
170   IF (NWDS.EQ.0) GO TO 180
          IREC1=IREC1+1
          NWR=NPT*NWDS-1
          IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(NPT),NWDS,1)
          IF (MODE.EQ.2) READ(NIN,340)(A(I),I=NPT,NWR)
C
C      STORE DOWN SCATTERING
C      IF (HLOCK.EQ.ELAS)CALL FTRDE(A(NPT),IA(L),J,LORDN)
C
C      STORE INELASTIC MATRIX
C      IF (HLOCK.EQ.ATNEL OR HLOCK.EQ.AN2N)CALL FTRSH(A(NPT),IA(L),J,
1    HLOCK=AN2N,LORDN)
      IF (IRD(7).NE.1) GO TO 180
      WRITE(NSYS,350)J
      CALL WOT(A(NPT),LORDN,IA(L),M1,6M ORDER,6M POSN ,M1,NSYS)
180   CONTINUE
190   CONTINUE
      RETURN
C
C
C
200   FDMAT (11X,AA,(1X,2AA,1X,16)

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210 FORMAT (11M OV ISOTXS ,A6,1M,2A6,1M,16) FCFT 257
220 FORMAT (4X,91A) FCFT 258
230 FORMAT (4M 10 ,916) FCFT 259
240 FORMAT (4M 20 ,1M,11A6,1M,1M,1M,9(1X,A6)/(10(1X,A6))) FCFT 260
250 FORMAT (4X,1X,11A6,1X,1X,A6,1X,9(1X,A6)/(10(1X,A6))) FCFT 261
260 FORMAT (1P,6E12,5) FCFT 262
270 FORMAT (4M 40 ,A6,1P,6E12,5/(1216)) FCFT 263
280 FORMAT (4X,A6,1P,6E12,5/(1216)) FCFT 264
290 FORMAT (4M 50 ,105E12,5/(6E12,5)) FCFT 265
300 FORMAT (4X,1P,6E12,5/(6E12,5)) FCFT 266
310 FORMAT (4M 60 ,105E12,5/(6E12,5)) FCFT 267
320 FORMAT (4X,1P,6E12,5/(6E12,5)) FCFT 268
330 FORMAT (4M 70 ,105E12,5/(6E12,5)) FCFT 269
340 FORMAT (4X,1P,6E12,5/(6E12,5)) FCFT 270
350 FORMAT (1M ,6X,5HGROUP,14) FCFT 271
360 FORMAT (24HOFILF CONTROL PARAMETERS//51H NGROUP NUMBER OF ENER FCFT 272
1GY GROUPS IN SET 112/51H NISO NUMBER OF ISOTOPES IN FCFT 273
2SET 112/51H MAXUP MAXIMUM NUMBER OF UPSCATTER GR FCFT 274
3GROUPS 112/51H MAXDN MAXIMUM NUMBER OF DOWNSCATTER GROUPS FCFT 275
4 112/51H MAXORD MAXIMUM SCATTERING ORDER 112/51H FCFT 276
5 ICHIST SET FISSION SPECTRUM FLAG 112/51H FCFT 277
6 ICHIST=1 SET VECTOR /51H FCFT 278
7 NAGROUP, SET MATRIX /51H N5MAX MAXIMUM NUMBER OF FCFT 279
HHBLOCKS OF 112/51H SCATTERING DATA FCFT 280
8 /51H NCBLCK BLOCKING CONTROL FOR SET CHI DATA FCFT 281
9 112/51H NSHLCK BLOCKING CONTROL FOR SCATTERING DATA 112) FCFT 282
370 FORMAT (1M,1P(AA)) FCFT 283
380 FORMAT (1M,4X,7HISOTOPE,4X,6HNAME) FCFT 284
390 FORMAT (1X,13,6X,A6) FCFT 285
400 FORMAT (17HOFISSION SPECTRUM) FCFT 286
410 FORMAT (13HOMFAN NEUTRON VELOCITY IN GROUP J/9X,1HJ) FCFT 287
420 FORMAT (21HOMAXIMUM ENERGY BOUND/ 1,6HGROUP,1HJ) FCFT 288
430 FORMAT (24HMINIMUM ENERGY BOUND OF SET//16X,E12,5) FCFT 289
440 FORMAT (13HNUMBER OF RECORDS TO BE SKIPPED//5X,7HISOTOPE,2X,6HNUM FCFT 290
1HER) FCFT 291
450 FORMAT (21HOFISSION SPECTRUM) FCFT 292
460 FORMAT (1M,1P(AA)) FCFT 293
470 FORMAT (27HISOTOPE CONTROL PARAMETERS//51H MABSID ABSOLUTE ISO FCFT 294
10PE LABEL 7X,A6/51H AMASS GRAM ATOMIC WEIGHT FCFT 295
2 E12,5/51H EFISS TOTAL THERMAL ENERGY YI FCFT 296
JELU/FISSION F12,5/51H (N,SEC/FISS) FCFT 297
4 /51H TEMP TEMPERATURE (DEG K) E FCFT 298
512,5/51H SIGPOT AV POTENTIAL SCATTERING (BAHNS/ATOM) E12,5/5 FCFT 299
61M ADENS REFERENCE ATOM DENSITY E12,5/51H KB FCFT 300
7R ISOTOPE CLASSIFICATION 112/51H FCFT 301
8 0=UNDEFINED /51H 1=FISSILE FCFT 302
9 /51H 2=FERTILE FCFT 303
10 /51H 3=OTHER ACTINIDE FCFT 304
11 /51H 4=FISSION PRODUCT /51H FCFT 305
12 5=STRUCTURE /51H FCFT 306
13 6=CDOLANT /51H 7=CONTROL FCFT 307
14 /51H NCITLA ISOTOPE CHI BLOCKING FAC FCFT 308
15 112/51H ICH= ISOTOPE FISSION SPECTRUM FLAG FCFT 309
16 112/51H ICHI=0 USE SET CHI FCFT 310
17 ) FCFT 311
480 FORMAT (51A 1 CHI VECTOR /51H FCFT 312
1 NAGROUP, CHI MATRIX /51H IFIS FCFT 313
2 (N,F) X=SECTION PRESENT (1=YES/0=NO) 112/51H IALF (N,ALPHA) FCFT 314
3 X=SECTION PRESENT (1=YES/0=NO) 112/51H INP (N,P) X=SECTION FCFT 315
4 PRESENT (1=YES/0=NO) 112/51H IN2N (N,2N) X=SECTION PRESENT FCFT 316
5 (1=YES/0=NO) 112/51H IND (N,D) X=SECTION PRESENT (1=YES/0 FCFT 317
6=NO) 112/51H INT (N,T) X=SECTION PRESENT (1=YES/0=NO) FCFT 318
714) FCFT 319
490 FORMAT (24HNSCATTERING TYPE FOR BLOCK N/9X,1M,6X,4HNTYPE) FCFT 320
500 FORMAT (13HNUMBER OF SCATTERING ORDERS IN BLOCK N/9X,1M,6X,4HNTYP FCFT 321
1E) FCFT 322
510 FORMAT (15HNSCATTERING BANDWIDTH FOR GROUP J, SCATTERING BLOCK N) FCFT 323
520 FORMAT (47HPOSITION OF IN=GROUP SCATTERING CROSS SECTION IN SCATT FCFT 324
1EING DATA FOR GROUP J, SCATTERING BLOCK N) FCFT 325
530 FORMAT (25HOPRINCIPAL CROSS-SECTIONS) FCFT 326
540 FORMAT (24HNSCATTERING FISSION SPECTRUM) FCFT 327
550 FORMAT (16HBLOCK,13,2X,1A,10H SCATTERING OMITTED) FCFT 328
560 FORMAT (4H0000 FILE,AA,11M -- VERSION,13,AM -- UNIT,13,3H000) FCFT 329
570 FORMAT (14M 00USER IDENTIFICATION,AA,3X,A6) FCFT 330
580 FORMAT (17HNSCATTERING TYPE,AA) FCFT 331
END FCFT 332
SUMROUTINE BRKXINSYS,N(N,NOHT) FCFT 333
***** FCFT 334
C ***** FCFT 335
C ***** FCFT 336
C ***** FCFT 337
DIMENSION A(11),IA(11) FCFT 338
COMMON/OPTS/MODE,NTYPE,IND(10) FCFT 339
COMMON/FTN/HILN(1),ATW(1),NT(1),NGB(1),HGF(1),NMFF(4,1),TEN(3,1) FCFT 340
1SF(4,1),B)FF(4,300,A),SR(0,100),SM(100,100),IGH,NXCMR FCFT 341
COMMON A FCFT 342
EQUIVALENCE (A(1),IA(1)) FCFT 343
DATA N,N,0,0,4/ FCFT 344

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C	---	FILE IDENTIFICATION	FCFTR	344
C			FCFTR	345
C			FCFTR	346
		IREC1=1	FCFTR	347
		NWDS=4	FCFTR	348
		IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(1),NWDS,1)	FCFTR	349
		IF (MODE.EQ.2) READ(NIN,110) (A(I),I=1,NWDS)	FCFTR	350
		FN=A(1)	FCFTR	351
		HU=A(2)	FCFTR	352
		MS=A(3)	FCFTR	353
		IVER=1	FCFTR	354
		WRITE (NSYS,420) FN,IVER,NIN	FCFTR	355
		WRITE (NSYS,430) HU,MS	FCFTR	356
C			FCFTR	357
C	---	FILE CONTROL	FCFTR	358
C			FCFTR	359
		IREC1=IREC1+1	FCFTR	360
		NWDS=4	FCFTR	361
		IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(1),NWDS,1)	FCFTR	362
		IF (MODE.EQ.2) READ(NIN,130) (A(I),I=1,NWDS)	FCFTR	363
		NORMIP=A(1)	FCFTR	364
		NISOSH=A(2)	FCFTR	365
		NSIGPT=A(3)	FCFTR	366
		NTEMP=A(4)	FCFTR	367
		DO 5 J=1,4	FCFTR	368
		NPFF(J,1)=NSIGPT	FCFTR	369
		IF (IND(1),NE.1) GO TO 10	FCFTR	370
		WRITE (NSYS,220) (TA(I),I=1,NWDS)	FCFTR	371
C			FCFTR	372
C	---	FILE DATA	FCFTR	373
C			FCFTR	374
10		NWDS=5+NISOSH+NSIGPT+NTEMP+NGROUP+1	FCFTR	375
		IREC1=IREC1+1	FCFTR	376
		IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(1),NWDS,1)	FCFTR	377
		IF (MODE.EQ.2) READ(NIN,150) (A(I),I=1,NISOSH)	FCFTR	378
		WRITE (NSYS,230)	FCFTR	379
		WRITE (NSYS,240) (TA(I),I=1,NISOSH)	FCFTR	380
		HOLN(1)=A(1)	FCFTR	381
		DO 14 J=1,4	FCFTR	382
		NPFF(J,1)=NSIGPT	FCFTR	383
		NEXT=NISOSH+1	FCFTR	384
		WRITE (NUUT,250)	FCFTR	385
		LL=NEXT+NSIGPT-1	FCFTR	386
		IF (MODE.EQ.2) READ(NIN,160) (A(I),I=NEXT,LL)	FCFTR	387
		NM=1	FCFTR	388
		IC2=0	FCFTR	389
		DO 20 J=NEXT,LL	FCFTR	390
		IC2=IC2+1	FCFTR	391
		WRITE (NSYS,260) NM,A(J)	FCFTR	392
		B=A(J)	FCFTR	393
		DO 25 I=1,4	FCFTR	394
25		SF(I,1,IC2)=10.0+0.8	FCFTR	395
20		NM=NM+1	FCFTR	396
		NEXT=NEXT+NSIGPT	FCFTR	397
		LL=NTEMP+1+NEXT	FCFTR	398
		WRITE (NSYS,270)	FCFTR	399
		NM=1	FCFTR	400
		IF (MODE.EQ.2) READ(NIN,160) (A(I),I=NEXT,LL)	FCFTR	401
		DO 30 J=NEXT,LL	FCFTR	402
		WRITE (NSYS,280) NM,A(J)	FCFTR	403
30		NM=NM+1	FCFTR	404
		IF (NTEMP.GT.3) LL=NEXT+2	FCFTR	405
		IC2=0	FCFTR	406
		DO 35 J=NEXT,LL	FCFTR	407
		IC2=IC2+1	FCFTR	408
35		TEM(IC2,1)=A(J)+.773,16	FCFTR	409
		NEXT=NEXT+NTEMP	FCFTR	410
		NM=NEXT+NGROUP+1	FCFTR	411
		IF (MODE.EQ.2) READ(NIN,160) (A(I),I=NEXT,NM)	FCFTR	412
		WRITE (NSYS,280)	FCFTR	413
		CALL WUTH(1,NEXT,NGROUP,A,M0,A,M0,A,M0,A,M0,A,M0,A,M0,NSYS)	FCFTR	414
		NM=NEXT+NGROUP+1	FCFTR	415
		NEXT=NEXT+NGROUP	FCFTR	416
		WRITE (NSYS,290) A(NEXT)	FCFTR	417
		NEXT=NEXT+1	FCFTR	418
		LL=NISOSH+1+NEXT	FCFTR	419
		WRITE (NSYS,300)	FCFTR	420
		NM=1	FCFTR	421
		IF (MODE.EQ.2) READ(NIN,170) (A(I),I=NEXT,LL)	FCFTR	422
		DO 40 J=NEXT,LL	FCFTR	423
		WRITE (NSYS,310) NM,A(J)	FCFTR	424
		NGH(1)=A(J)	FCFTR	425

40	NM=NM+1	FCFTR	426
	NEA2=NEA1+NISOSH	FCFTR	427
	LL=NISOSH-1+NEK2	FCFTR	428
	WRITE(NSYS,320)	FCFTR	429
	NM=1	FCFTR	430
	IF (MODE.EQ.2) READ(NIN,170) (IA(1),I=NEK2,LL)	FCFTR	431
	DO 50 J=NEK2,LL	FCFTR	432
	WRITE(NSYS,310) NM,IA(J)	FCFTR	433
	NGE(J)=IA(J)	FCFTR	434
50	NM=NM+1	FCFTR	435
	NFX3=NEA2+NISOSH	FCFTR	436
	LL=NISOSH-1+NFX3	FCFTR	437
	WRITE(NSYS,330)	FCFTR	438
	NM=1	FCFTR	439
	IF (MODE.EQ.2) READ(NIN,170) (IA(1),I=NEK3,LL)	FCFTR	440
	DO 60 J=NEK3,LL	FCFTR	441
	WRITE(NSYS,310) NM,IA(J)	FCFTR	442
60	NM=NM+1	FCFTR	443
	NEA4=NEA3+NISOSH	FCFTR	444
	LL=NISOSH-1+NFX4	FCFTR	445
	WRITE(NSYS,340)	FCFTR	446
	NM=1	FCFTR	447
	IF (MODE.EQ.2) READ(NIN,170) (IA(1),I=NEK4,LL)	FCFTR	448
	DO 70 J=NEK4,LL	FCFTR	449
	WRITE(NSYS,310) NM,IA(J)	FCFTR	450
70	NM=NM+1	FCFTR	451
	NEA5=NEA4+NISOSH	FCFTR	452
	NEK5=NEA5+1	FCFTR	453
	NFX2=NEK1+NISOSH	FCFTR	454
	NEA3=NEA2+NISOSH	FCFTR	455
	NEK4=NEK3+NISOSH	FCFTR	456
	IF (MODE.EQ.2) CALL RITE(NDOUT,IREC1,A(1),NWDS,1)	FCFTR	457
C		FCFTR	458
C	---SELF-SHIELDING FACTORS	FCFTR	459
C		FCFTR	460
	JSSF=NEK4+NISOSH	FCFTR	461
	DO 90 I=1,NISOSH	FCFTR	462
	KNEX13=1+I	FCFTR	463
	NBINT=IA(K)	FCFTR	464
	KNEX14=1+I	FCFTR	465
	NHTFM=IA(K)	FCFTR	466
	KNEX1=1+I	FCFTR	467
	JRFL1=IA(K)	FCFTR	468
	KNEX12=1+I	FCFTR	469
	JBFH1=IA(K)	FCFTR	470
	NDIFF=JHFI-JHFL1	FCFTR	471
	NPRN=NBINT+NHTFM+NDIFF	FCFTR	472
	NWDS=50*NPNO	FCFTR	473
	IF (NWDS.LE.0) GO TO 80	FCFTR	474
	IREC1=IREC1+1	FCFTR	475
	NWR=JSSF+NWDS-1	FCFTR	476
	IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(JSSF),NWDS,1)	FCFTR	477
	IF (MODE.EQ.2) READ(NIN,190) (A(1),I=JSSF,NWR)	FCFTR	478
	J2=JSSF+NPNO	FCFTR	479
	J3=J2+NPNO	FCFTR	480
	J4=J3+NPNO	FCFTR	481
	J5=J4+NPNO	FCFTR	482
	CALL FTHFF(A(J2),A(J2),A(JSSF),A(J5),NBINT,NBTEM,NDIFF)	FCFTR	483
	IF (IRU(3),NE.1) GO TO 80	FCFTR	484
	WRITE(NSYS,350)	FCFTR	485
	CALL WUT(A(JSSF),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NSYS)	FCFTR	486
	WRITE(NSYS,360)	FCFTR	487
	CALL WOT(A(J2),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NSYS)	FCFTR	488
	WRITE(NSYS,370)	FCFTR	489
	CALL WOT(A(J3),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NSYS)	FCFTR	490
	WRITE(NSYS,380)	FCFTR	491
	CALL WOT(A(J4),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NSYS)	FCFTR	492
	WRITE(NSYS,390)	FCFTR	493
	CALL WOT(A(J5),NBINT,NBTEM,NDIFF,1HN,1HK,1HJ,NSYS)	FCFTR	494
80	CONTINUE	FCFTR	495
C		FCFTR	496
C	---CROSS SECTIONS	FCFTR	497
C		FCFTR	498
	NWDS=6*NGROUP	FCFTR	499
	IREC1=IREC1+1	FCFTR	500
	NWR=JSSF+NWDS-1	FCFTR	501
	IF (MODE.EQ.1) CALL REED(NIN,IREC1,A(JSSF),NWDS,1)	FCFTR	502
	IF (MODE.EQ.2) READ(NIN,210) (A(1),I=JSSF,NWR)	FCFTR	503
	J2=JSSF+NGROUP	FCFTR	504
	J3=J2+NGROUP	FCFTR	505
	J4=J3+NGROUP	FCFTR	506
	J5=J4+NGROUP	FCFTR	507
	J6=J5+NGROUP	FCFTR	508
	CALL FTHSM(A(J2),A(J3),A(J4),A(J6),NGROUP)	FCFTR	509
	IF (IRU(4),NE.1) GO TO 90	FCFTR	510

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WRITE(NSYS,400)
WRITE(NSYS,410)
CALL WOTH(A1,J55F,NGROUP,A(J2),NGROUP,A(J3),NGROUP,A(J4),NGROUP,
1  A(J5),NGROUP,A(J6),NGROUP,A(M0),M0,NSYS)
40 CONTINUE
RETURN
C
C
C
100 FORMAT (11M OV RPKXS *A6*(M*2A6*1M*16)
110 FORMAT (11X,AA,1X,2A6,1X,16)
120 FORMAT (4M 10 ,*12)
130 FORMAT (4X,4(A)
140 FORMAT (4M 20 ,9*(1X,A6)/(10(1X,A6)))
150 FORMAT (4X,9(1X,A6)/(10(1X,A6)))
160 FORMAT (10E12,5)
170 FORMAT (1216)
180 FORMAT (4M 30 ,10E12,5/(6E12,5))
190 FORMAT (4X,10E12,5/(6E12,5))
200 FORMAT (4M 40 ,10E12,5/(6E12,5))
210 FORMAT (4X,10E12,5/(6E12,5))
220 FORMAT (24M0FILE CONTRL PARAMETERS//51M NGROUP NUMBER OF ENER
16Y GROUPS IN SET 117/51M NISOSH NUMBER OF ISOTOPIES WIT
2H SELF- /51M SHIELDING FACTORS
3 112/51M NSIGPT TOTAL NUMBER OF VALUES OF VARIABLE X /5
41M WHICH ARE GIVEN, NSIGPT IS EQUAL TO /51M
5 THE SUM FROM 1 TO NISOSH OF NTAHT(I) 112/51M NTEMPT TOTAL
6 NUMBER OF VALUES "F VARIABLE TB /51M WHICH ARE GIVE
7N. NTEMPT IS EQUAL TO /51M THE SUM FROM 1 TO NISOSH
90F NTAHT(I) 112)
230 FORMAT (1M0,4X,7HISOTOPE,4X,4HNAME)
240 FORMAT (5X,13,7X,A6)
250 FORMAT (41M0LN(SIGPT)/LN(10) VALUES FOR ALL ISOTOPIES/5X,7HISOTOPE,
17X,5HVALUE)
260 FORMAT (7X,13,6X,E12,5)
270 FORMAT (30M0TEMPERATURES FOR ALL ISOTOPIES/5X,7HISOTOPE*5X,9MDEGREE
1S C)
280 FORMAT (21M0MAXIMUM ENERGY ROUND/3X,6MGRCP ,1M)
290 FORMAT (2M0MINIMUM ENERGY ROUND OF SET//16X,E12,5)
300 FORMAT (M0MNUMBER OF LOWEST ENERGY GROUP FOR WHICH SELF-SHIELDING
1 FACTORS GIVEN/4X,7HISOTOPE,7X,5HGROUP)
310 FORMAT (7X,13,4X,13)
320 FORMAT (7M0NUMBER OF HIGHEST ENERGY GROUP FOR WHICH SELF-SHIELDIN
16 FACTORS GIVEN/4X,7HISOTOPE,7X,5HGROUP)
330 FORMAT (M0MNUMBER OF SIGPT VALUES FOR WHICH SELF-SHIELDING FACTOR
1S ARE GIVEN/5X,7HISOTOPE,4X,4HNUMBER)
340 FORMAT (72M0NUMBER OF TEMPERATURE VALUES FOR WHICH SELF-SHIELDING
1FACTORS ARE GIVEN/5X,7HISOTOPE,6X,6HNUMBER)
350 FORMAT (29M0TOTAL SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)
360 FORMAT (31M0CAPTURE SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)
370 FORMAT (31M0FISSION SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)
380 FORMAT (33M0TRANSPORT SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)
390 FORMAT (31M0ELASTIC SELF-SHIELDING FACTORS,10X,7HISOTOPE,13)
400 FORMAT (15M0ROSS SECTIONS)
410 FORMAT (4M0POSITION,4X,13M0ROSS SECTION//4X,1M1,4X,2M0POTENTIAL SC
1ATTENING/4X,1M2,4X,4M0ELASTIC/4X,1M3,4X,7M0ELASTIC/4X,1M4,4X,42M0V
PERAGE COEF OF ELASTIC SCATTERING ANGLE/4X,1M5,4X,4M0ELASTIC DOWN
3-SCATTERING TO ADJACENT GROUP/4X,1M6,4X,4M0ELASTIC ELASTIC SCATTER
4ING LEHARGY INCREMENT//4X,5HGROUP,30X,4M0POSITION/1AT,0,112,11X)
420 FORMAT (9M000 FILE,AB,11M -- VERSION,13,4H -- UNIT,12,3M000)
430 FORMAT (24M 00USER IDENTIFICATION**A0,3X,A6)
END
SUBROUTINE WNT1Y,11,JJ,KK,TOP1,TOP2,TOP3,NOUT)
PRINTS A SINGLE ONE- TWO- OR THREE-DIMENSIONAL REAL ARRAY,
C
C
C --NOT PRINTS 1,2, OR 3-DIMENSIONAL ARRAYS
C
DIMENSION X(11,JJ,KK)
DO 110 K=1,KK
J02=0
J03=(JJ+1)/9
IF (KK,LE,3) GO TO 10
WRITE (NOUT,120)TOP3,K
DO 100 JK=1,J03
J01=J02+1
J02=MIN(J01+9,JJ)
WRITE (NOUT,130)TOP1,TOP2,J,J01,J02)
NFLAG=0
DO 90 I=1,11
SSUM=0.0
DO 70 J=J01,J02
SSUM=SSUM+ABS(X(I,J,K))
IF (SSUM.NP.0.0) GO TO 30
NFLAG=NFLAG+1
IF (1,LT,11) GO TO 90
IF (NFLAG=1) A0,A0,A0
30 H=1-NFLAG

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FCFTR 511
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	IM1=J-1	FCFTR	598
	IF ((I1,LT,I1),OR,(SSUM,NE,0,0)) GO TO 50	FCFTR	599
	NEB=1	FCFTR	600
	IM1=J	FCFTR	601
50	WRITE (NOU,160)N,IM1,(X(IM1,J,K),J=J01,J02)	FCFTR	602
	GO TO 70	FCFTR	603
60	IF (SSUM,LE,0,0) GO TO 80	FCFTR	604
	IM1=J-1	FCFTR	605
	WRITE (NOU,140)IM1,(X(IM1,J,K),J=J01,J02)	FCFTR	606
70	CONTINUE	FCFTR	607
	NEFLAS=0	FCFTR	608
	IF (SSUM,LE,0,0) GO TO 90	FCFTR	609
80	WRITE (NOU,140)IM1,(X(IM1,J,K),J=J01,J02)	FCFTR	610
90	CONTINUE	FCFTR	611
100	CONTINUE	FCFTR	612
110	CONTINUE	FCFTR	613
	RETURN	FCFTR	614
C		FCFTR	615
C		FCFTR	616
C		FCFTR	617
120	FORMAT (IM,6X,A6,I5)	FCFTR	618
130	FORMAT (IM,6X,A6,9(4X,A6,I3))	FCFTR	619
140	FORMAT (IM,110,4X,109E13,5)	FCFTR	620
150	FORMAT (IM,17,3M TO,4,109F13,5)	FCFTR	621
160	END	FCFTR	622
	SUBROUTINE NOTR(A,L1,B,L2,C,L3,D,L4,E,L5,F,L6,G,L7,H,L8,NOU)	FCFTR	623
C		FCFTR	624
C	---SUBROUTINE NOTB PRINTS UP TO 8 ONE-DIMENSIONAL ARRAYS.	FCFTR	625
C		FCFTR	626
	DIMENSION FPT(19), FNT(6), L(8), Z(8), N(8), A(1), B(1), C(1), D(1)	FCFTR	627
	, E(1), F(1), G(1), H(1)	FCFTR	628
	EQUIVALENCE (Z,M)	FCFTR	629
	DATA X,K,FPT(1),FPT(2),FPT(19)/4M,100000,4M(1PI,4H10,4M) /	FCFTR	630
	DATA FNT(1),FNT(2),FNT(3),FNT(4),FNT(5),FNT(6)/4HE13,4H5,4H,18	FCFTR	631
	1,4H58,4M,9X,4H46 /	FCFTR	632
	L(1)=L1	FCFTR	633
	L(2)=L2	FCFTR	634
	L(3)=L3	FCFTR	635
	L(4)=L4	FCFTR	636
	L(5)=L5	FCFTR	637
	L(6)=L6	FCFTR	638
	L(7)=L7	FCFTR	639
	L(8)=L8	FCFTR	640
	N=0	FCFTR	641
	DO 10 I=1,8	FCFTR	642
	N=MAX0(N,L(I))	FCFTR	643
10	CONTINUE	FCFTR	644
	DO 120 I=1,N	FCFTR	645
	DO 110 J=1,8	FCFTR	646
	IF (L(J),GE,I) GO TO (20,30,40,50,60,70,80,90), J	FCFTR	647
	Z(J)=X	FCFTR	648
	FPT(2*J-1)=FNT(5)	FCFTR	649
	FPT(2*J-2)=FNT(6)	FCFTR	650
	GO TO 110	FCFTR	651
20	Z(J)=A(I)	FCFTR	652
	GO TO 100	FCFTR	653
30	Z(J)=B(I)	FCFTR	654
	GO TO 100	FCFTR	655
40	Z(J)=C(I)	FCFTR	656
	GO TO 100	FCFTR	657
50	Z(J)=D(I)	FCFTR	658
	GO TO 100	FCFTR	659
60	Z(J)=E(I)	FCFTR	660
	GO TO 100	FCFTR	661
70	Z(J)=F(I)	FCFTR	662
	GO TO 100	FCFTR	663
80	Z(J)=G(I)	FCFTR	664
	GO TO 100	FCFTR	665
90	Z(J)=H(I)	FCFTR	666
	FPT(2*J-1)=FNT(1)	FCFTR	667
100	FPT(2*J-2)=FNT(2)	FCFTR	668
	IF (K,LE,IABS(M(I))) GO TO 110	FCFTR	669
	IF (Z(J),EQ,0,0) M(I)=0	FCFTR	670
	FPT(2*J-1)=FNT(3)	FCFTR	671
	FPT(2*J-2)=FNT(4)	FCFTR	672
110	CONTINUE	FCFTR	673
	WRITE (NOU,FPT1),(Z(J),J=1,8)	FCFTR	674
120	CONTINUE	FCFTR	675
	RETURN	FCFTR	676
	END	FCFTR	677
	SUBROUTINE NOTC (IX,II,JJ,KK,TOP1,TOP2,TOP3,NOU)	FCFTR	678
C	PRINTS A SINGLE ONE-, TWO-, OR THREE-DIMENSIONAL INTEGER ARRAY.	FCFTR	679
	DIMENSION IX(1:JJ,KK)	FCFTR	680
	DO 20 K=1,KK	FCFTR	681
	J02=0	FCFTR	682
		FCFTR	683

	J03=(JJ*24)/25	FCFTR	684
	IF (KK.LE.1) GO TO 10	FCFTR	685
10	WRITE (NOU,30)TOP3,K	FCFTR	686
	DO 20 JK=1,J03	FCFTR	687
	J01=J02+1	FCFTR	688
	J02=MIN(J01+24,JJ)	FCFTR	689
	WRITE (NOU,40)TOP1,TOP2,(J,J=J01,J02)	FCFTR	690
	DO 20 I=1,I1	FCFTR	691
	WRITE (NOU,50)I,(I(X(I,J,K),J=J01,J02)	FCFTR	692
20	CONTINUE	FCFTR	693
	RETURN	FCFTR	694
C		FCFTR	695
C		FCFTR	696
C		FCFTR	697
30	FORMAT (/1H0,6X,A6,I5)	FCFTR	698
40	FORMAT (/1H0,6X,1H,A6,25I4)	FCFTR	699
50	FORMAT (1H,16,7X,5I4)	FCFTR	700
	END	FCFTR	701
	SUBROUTINE REED(N,INEC,X,L,MODE)	FCFTR	702
	01MENSION X(L)	FCFTR	703
	IF(L.LE.0) RETURN	FCFTR	704
	READ (N)(X(I),I=1,L)	FCFTR	705
	RETURN	FCFTR	706
	END	FCFTR	707
	SUBROUTINE RITE(N,REC,X,L,MODE)	FCFTR	708
	01MENSION X(L)	FCFTR	709
	IF(L.LE.0) RETURN	FCFTR	710
	WRITE (N)(X(I),I=1,L)	FCFTR	711
	RETURN	FCFTR	712
	END	FCFTR	713
	SUBROUTINE STOW(A,R,NWDS)	FCFTR	714
	01MENSION A(NWDS),R(NWDS)	FCFTR	715
	IF (NWDS.LE.0) RETURN	FCFTR	716
	DO 10 N=1,NWDS	FCFTR	717
10	R(N)=A(N)	FCFTR	718
	RETURN	FCFTR	719
	END	FCFTR	720
	SUBROUTINE STOWT(IA,IB,NWDS)	FCFTR	721
	01MENSION IA(NWDS),IB(NWDS)	FCFTR	722
	IF (NWDS.LE.0) RETURN	FCFTR	723
	DO 10 N=1,NWDS	FCFTR	724
10	IB(N)=IA(N)	FCFTR	725
	RETURN	FCFTR	726
	END	FCFTR	727
	SUBROUTINE ARRAY(I,J,N,M,S,D)	FCFTR	728
	01MENSION S(I),D(I)	FCFTR	729
	IJ=0	FCFTR	730
	NM=0	FCFTR	731
	N=N+1	FCFTR	732
	DO 20 K=1,J	FCFTR	733
	DO 10 L=1,I	FCFTR	734
	IJ=IJ+1	FCFTR	735
	NM=N+1	FCFTR	736
10	S(IJ)=D(NM)	FCFTR	737
20	NM=N+1	FCFTR	738
	RETURN	FCFTR	739
	END	FCFTR	740
	SUBROUTINE FTRSM(X,JJ,NG,BLOCK,ANZN,KK)	FCFTR	741
C	*****	FCFTR	742
C		FCFTR	743
C	SET UP INELASTIC MATRIX AND ADD 20N*2N MATRIX	FCFTR	744
C	NOTE THAT MINX ALREADY MULTIPLIES N*2N MATRIX BY 2	FCFTR	745
C	*****	FCFTR	746
C	*****	FCFTR	747
	COMMON/FR/HOLN(1),ATW(1),NT(1),NOB(1),NGF(1),NPFF(4,1),TEM(3,1),	FCFTR	748
	ISF(4,1),R1,FF(4,30),R,SR(9,100),SM(100,100),IGM,NACMR	FCFTR	749
	01MENSION X(KK,JJ)	FCFTR	750
	IF(JJ.EQ.0) RETURN	FCFTR	751
	JL=NG	FCFTR	752
	IF(BLOCK.EQ.ANZN)GO TO 20	FCFTR	753
	DO 10 J=1,JJ	FCFTR	754
	SM(JL,J)=X(I,J)	FCFTR	755
	JL=JL+1	FCFTR	756
10	CONTINUE	FCFTR	757
	RETURN	FCFTR	758
20	DO 10 J=1,JJ	FCFTR	759
	SM(JL,J)=SM(JL,J)+X(I,J)	FCFTR	760
	JL=JL+1	FCFTR	761
30	CONTINUE	FCFTR	762
	RETURN	FCFTR	763
	END	FCFTR	764
	SUBROUTINE FTRDEL(X,JJ,NG,KK)	FCFTR	765
C	*****	FCFTR	766
C		FCFTR	767
C	SET UP THE ELASTIC REMOVE-L-SUM OVER ALL DOWN COMPONENTS OF ELASTIC	FCFTR	768
C	*****	FCFTR	769
C		FCFTR	770
	01MENSION X(KK,JJ)	FCFTR	771
	COMMON/FR/HOLN(1),ATW(1),NT(1),NOB(1),NGF(1),NPFF(4,1),TEM(3,1),	FCFTR	772
	ISF(4,1),B1,FF(4,30),R,SR(9,100),SM(100,100),IGM,NACMR	FCFTR	773
	IF(NG.EQ.1) RETURN	FCFTR	774

	I=NG-1	FCFTR	775
C	CALCULATE REMOVAL (ELASTIC) CROSS SECTION	FCFTR	776
	DO 10 J=2,JJ	FCFTR	777
	SR(4,I)=SR(4,I)+X(1,J)	FCFTR	778
10	I=I+1	FCFTR	779
	RETURN	FCFTR	780
	END	FCFTR	781
	SUBROUTINE FTRSR(X,NGP,NKD,IFIS,IALF,INP,INZN)	FCFTR	782
C	*****	FCFTR	783
C	SAVE PRINCIPAL X-SECTIONS FOR PTR TAPE	FCFTR	784
C	*****	FCFTR	785
C	DIMENSION X(NGP,NKD)	FCFTR	786
C	COMMON/FTR/HOLN(1),ATW(1),NT(1),NGB(1),NGF(1),NPFF(4,1),TEM(3,1),	FCFTR	787
	ISF(4,1,8),FF(4,300,8),SR(9,100),SM(100,100),IGM,NKCMR	FCFTR	788
C	*****	FCFTR	789
C	INITIALIZE	FCFTR	790
	DO 10 K=1,4	FCFTR	791
	DO 10 I=1,100	FCFTR	792
10	SR(K,I)=0.0	FCFTR	793
C	TOTAL CROSS SECTION AND CAPTURE CROSS SECTION	FCFTR	794
	DO 20 N=1,NGP	FCFTR	795
	SH(1,N)=X(N,3)	FCFTR	796
20	SR(4,N)=X(N,4)	FCFTR	797
C	FISSTION AND MU	FCFTR	798
	IF (IFIS.EQ.0) GO TO 40	FCFTR	799
	DO 30 N=1,NGP	FCFTR	800
	SR(2,N)=X(N,5)	FCFTR	801
30	SR(1,N)=X(N,6)	FCFTR	802
40	IF (INZN.EQ.0) RETURN	FCFTR	803
C	SUBTRACT N,2N FROM CAPTURE X-SECTION	FCFTR	804
	NPL=4	FCFTR	805
	IF (IFIS.GT.0) NPL=7	FCFTR	806
	IF (IALF.GT.0) NPL=8	FCFTR	807
	IF (INP.GT.0) NPL=9	FCFTR	808
	NPL=NPL+1	FCFTR	809
	DO 50 N=1,NGP	FCFTR	810
	SH(4,N)=SH(4,N)-X(N,NPL)	FCFTR	811
C	TEMP. STORE N,2N IN THE INELASTIC LOCATION SUBTRACT FROM INEL LATE	FCFTR	812
50	SR(5,N)=X(N,NPL)	FCFTR	813
	RETURN	FCFTR	814
	END	FCFTR	815
	SUBROUTINE FTRFF(FFF,FFC,FFT,FFE,II,JJ,KK)	FCFTR	816
C	*****	FCFTR	817
C	SAVE THE F-FACTORS	FCFTR	818
C	*****	FCFTR	819
C	DIMENSION FFF(II,JJ,KK),FFC(II,JJ,KK),FFT(II,JJ,KK),FFE(II,JJ,KK)	FCFTR	820
	COMMON/FTR/HOLN(1),ATW(1),NT(1),NGB(1),NGF(1),NPFF(4,1),TEM(3,1),	FCFTR	821
	ISF(4,1,8),FF(4,300,8),SR(9,100),SM(100,100),IGM,NKCMR	FCFTR	822
	NT=NT+II	FCFTR	823
	NT=NT+JJ	FCFTR	824
	NT=NT+KK	FCFTR	825
	IF (NITEM.GT.3) NITEM=3	FCFTR	826
	JK=0	FCFTR	827
	NT=NITEM	FCFTR	828
	IF (INT.LT.3) INT=3	FCFTR	829
	DO 10 K=1,NDIF	FCFTR	830
	DO 10 J=1,NT	FCFTR	831
	JK=JK+1	FCFTR	832
	DO 10 N=1,NBINT	FCFTR	833
	FF(1,JK,N)=0.0	FCFTR	834
	FF(2,JK,N)=0.0	FCFTR	835
	FF(3,JK,N)=0.0	FCFTR	836
10	FF(4,JK,N)=0.0	FCFTR	837
	JK=0	FCFTR	838
	DO 30 K=1,NDIF	FCFTR	839
	DO 20 J=1,NITEM	FCFTR	840
	JK=JK+1	FCFTR	841
	DO 20 N=1,NBINT	FCFTR	842
	IF (FFF(N,J,K),GT.1.0) FFF(N,J,K)=1.0	FCFTR	843
	IF (FFC(N,J,K),GT.1.0) FFC(N,J,K)=1.0	FCFTR	844
	IF (FFT(N,J,K),GT.1.0) FFT(N,J,K)=1.0	FCFTR	845
	IF (FFE(N,J,K),GT.1.0) FFE(N,J,K)=1.0	FCFTR	846
	FF(1,JK,N)=FFF(N,J,K)	FCFTR	847
	FF(2,JK,N)=FFC(N,J,K)	FCFTR	848
	FF(3,JK,N)=FFT(N,J,K)	FCFTR	849
20	FF(4,JK,N)=FFE(N,J,K)	FCFTR	850
	IF (NITEM.LT.2) JK=JK+1	FCFTR	851
	IF (NITEM.EQ.1) JK=JK+1	FCFTR	852
30	CONTINUE	FCFTR	853
	RETURN	FCFTR	854
	END	FCFTR	855

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C      SUBROUTINE FTRSM(XIN,XEL,XMU,XXI,NGP)                                FCFTY 863
C      .....                                FCFTY 864
C      SAVE THE REMAINING CROSS SECTION INFORMATION AND BALANCE SET          FCFTY 865
C      .....                                FCFTY 866
C      .....                                FCFTY 867
C      .....                                FCFTY 868
C      DIMENSION XIN(NGP),XEL(NGP),XMU(NGP),XXI(NGP)                        FCFTY 869
C      COMMON/FTR/HOLN(1),ATW(1),NT(1),NGB(1),NGE(1),NPFF(4,1),TEM(3,1),    FCFTY 870
1 SF(4,1,8),FF(4,3,0,8),SR(9,100),SM(100,100),IGH,NXCNR                      FCFTY 871
C      DO 10 I=1,NGP                                                         FCFTY 872
C      SR(5,I)=2.*SR(5,I)+XIN(I)                                             FCFTY 873
C      SR(6,I)=XEL(I)                                                         FCFTY 874
C      SR(7,I)=XMU(I)                                                         FCFTY 875
C      SR(8,I)=XXI(I)                                                         FCFTY 876
C      .....                                FCFTY 877
C      NOW MAKE BALANCED CROSS SECTION SET                                   FCFTY 878
C      N=1                                                                     FCFTY 879
10  SM(1,N)=SM(2,N)+SR(4,N)+SR(5,N)+SR(6,N)                                FCFTY 880
C      RETURN                                                                  FCFTY 881
C      END                                                                    FCFTY 882
C      SUBROUTINE MAKFTR(NSYS,NFTR)                                          FCFTY 883
C      .....                                FCFTY 884
C      .....                                FCFTY 885
C      WRITE FTR TAPE ON UNIT NFTR (INARY)                                  FCFTY 886
C      .....                                FCFTY 887
C      DIMENSION HF(2,4)                                                     FCFTY 888
C      COMMON A(1)                                                            FCFTY 889
C      COMMON/FTR/HOLN(1),ATW(1),NT(1),NGB(1),NGE(1),NPFF(4,1),TEM(3,1),    FCFTY 890
1 SF(4,1,8),FF(4,3,0,8),SR(9,100),SM(100,100),IGH,NXCNR                      FCFTY 891
C      DATA HF(1,1),HF(2,1),HF(1,2),HF(2,2),HF(1,3),HF(2,3),             FCFTY 892
2 HF(1,4),HF(2,4) / 4HFISS,3HION,4HCAPT,3HURE,                             FCFTY 893
C      2 4H TO,3HTAL,4HFLAS,3HTIC/                                          FCFTY 894
C      NH=NGH(M)                                                             FCFTY 895
C      NE=NGE(M)                                                             FCFTY 896
C      IF (NT(1).GT.0) NH=3*NGB(M)-2                                         FCFTY 897
C      IF (NT(1).GT.0) NE=3*NGE(M)                                           FCFTY 898
C      N=1                                                                     FCFTY 899
C      NOUT=NSYS                                                             FCFTY 900
C      WRITE(NFTR) HOLN(M),ATW(M),NT(M),NGB(M),NGE(M),                     FCFTY 901
1 (NPFF(K,M),K=1,4),TEM(K,M),K=1,3)                                           FCFTY 902
C      DO 10 K=1,4                                                           FCFTY 903
C      NF=NPFF(K,M)                                                         FCFTY 904
C      IF (NF.EQ.0) GO TO 10                                                 FCFTY 905
C      WRITE(NFTR) (SF(K,M,N),N=1,NF)                                       FCFTY 906
10  WRITE(NFTR) ((FF(K,J,N),N=1,NF),J=NB,NE)                                FCFTY 907
C      CONTINUE                                                             FCFTY 908
C      WRITE(NFTR) ((SR(K,IG),K=1,9),IG=1,IGH)                             FCFTY 909
C      WRITE(NFTR) ((SM(IG,K),K=1,NXCNR),IG=1,IGH)                         FCFTY 910
C      .....                                FCFTY 911
C      NOW EDIT WHAT HAS BEEN WRITTEN ON TAPE                               FCFTY 912
C      .....                                FCFTY 913
C      PRINT DATA IN THE RUSSIAN FORMAT                                    FCFTY 914
C      WRITE(NOUT,60) M, HOLN(M)                                             FCFTY 915
C      WRITE(NOUT,50)                                                       FCFTY 916
C      CALL MOUTSM(1,1,9,TEM,0,6M TYPE,60M GROUP,1,NSYS)                 FCFTY 917
C      WRITE(NOUT,40) HOLN(M)                                               FCFTY 918
100  DO 100 IIG=1,IGH                                                       FCFTY 919
C      WRITE(NOUT,40) IIG, (SM(IIG,K),K=1,NXCNR)                          FCFTY 920
C      DO 100 K=1,4                                                         FCFTY 921
C      NF=NPFF(K,M)                                                         FCFTY 922
C      IF (NF) 300, 400, 110                                               FCFTY 923
C      IF (NT(M)) 120, 120, 220                                             FCFTY 924
110  WRITE(NOUT,130) (HF(KI,K),K=1,2), HOLN(M)                             FCFTY 925
120  WRITE(NOUT,140) (SF(K,M,N),N=1,NF)                                     FCFTY 926
C      WRITE(NOUT,170)                                                       FCFTY 927
C      DO 100 J=NB,NE                                                       FCFTY 928
180  WRITE(NOUT,150) J, (FF(K,J,N),N=1,NF)                                FCFTY 929
C      GO TO 100                                                            FCFTY 930
220  WRITE(NOUT,210) (HF(KI,K),K=1,2), HOLN(M), (TEM(KI,M),K=1,3)         FCFTY 931
C      WRITE(NOUT,100) (SF(K,M,N),N=1,NF), (SF(K,M,N),N=1,NF),           FCFTY 932
1 (SF(K,M,N),N=1,NF)                                                       FCFTY 933
C      WRITE(NOUT,170)                                                       FCFTY 934
C      NH=NGH(M)                                                           FCFTY 935
C      NE=NGE(M)                                                           FCFTY 936
C      DO 200 IIG=NH,NE                                                     FCFTY 937
C      J=1+IIG-1                                                           FCFTY 938
200  WRITE(NOUT,100) IIG, (FF(K,J,N),N=1,NF), (FF(K,J+1,N),N=1,NF),      FCFTY 939
1 (FF(K,J+2,N),N=1,NF)                                                     FCFTY 940
C      CONTINUE                                                             FCFTY 941
C      RETURN                                                                FCFTY 942
C      FORMAT(1M),I4,5X,24M CROSS SECTION DATA FOR (AB//)              FCFTY 943
50  FORMAT(10TYPE 1 TOTAL CROSS SECTION//                                FCFTY 944
1 1 TYPE 2 FISSION CROSS SECTION//                                       FCFTY 945
2 2 TYPE 3 APO//                                                         FCFTY 946
3 3 TYPE 4 CAPTURE CROSS SECTION//                                       FCFTY 947
4 4 TYPE 5 THELASTIC CROSS SECTION//                                     FCFTY 948
5 5 TYPE 6 ELASTIC CROSS SECTION//                                       FCFTY 949
6 6 TYPE 7 MULTIASTIC//                                                  FCFTY 950
7 7 TYPE 8 DECREASING DOWN INCREMENT//                                  FCFTY 951

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	M	* TYPE 2 ELASTIC DOWN SCATTER*	FCFTR	952
70		FORMAT(I0, F9.3, HF10.3)	FCFTR	953
80		FORMAT(///33H INELASTIC SCATTERING MATRIX FOR A6.7H	FCFTR	954
		100H GROUP G1G G1G.1 G1G.2 . . . //)	FCFTR	955
90		FORMAT(I0, F10.3, 11F10.3, / (E13,3,11F10.3)) . . . //)	FCFTR	956
130		FORMAT(/1H0, A4.4, 2RM SELF-SHIELDING FACTORS FOR A6.76H (TEMPERATU	FCFTR	957
		1RE INDEPENDENT)/)	FCFTR	958
160		FORMAT(6M SIGD , 1P1HE7.1)	FCFTR	959
170		FORMAT(6M GROUP/)	FCFTR	960
190		FORMAT(I0, F9.3, 17F7.3)	FCFTR	961
230		FORMAT(/1H0, A4.4, 2RM SELF-SHIELDING FACTORS FOR A6.17H ARE GIVEN	FCFTR	962
		1AT T =.F5.0, 1H,.F5.0, 6M, AND ,F5.0, 15M DEGREES KELVIN/)	FCFTR	963
		END	FCFTR	964