======================================================================= Legend

Legend

PROGRAM LEGEND Legend

============== Legend

VERSION 80-1 (SEPTEMBER 1980) Legend

VERSION 84-1 (NOVEMBER 1984) Legend

VERSION 86-1 (JANUARY 1986) \*CORRECTED BASED ON USER COMMENTS Legend

\*FORTRAN-77/H VERSION Legend

VERSION 87-1 (JANUARY 1987) \*CORRECTED BASED ON USER COMMENTS Legend

VERSION 88-1 (JULY 1988) \*OPTION...INTERNALLY DEFINE ALL I/O Legend

FILE NAMES (SEE, SUBROUTINE FILEIO Legend

FOR DETAILS). Legend

\*IMPROVED BASED ON USER COMMENTS. Legend

VERSION 89-1 (JANUARY 1989) \*PSYCHOANALYZED BY PROGRAM FREUD TO Legend

INSURE PROGRAM WILL NOT DO ANYTHING Legend

CRAZY. Legend

\*UPDATED TO USE NEW PROGRAM CONVERT Legend

KEYWORDS. Legend

\*ADDED LIVERMORE CIVIC COMPILER Legend

CONVENTIONS. Legend

VERSION 92-1 (JANUARY 1992) \*FOR ANGULAR DISTRIBUTIONS CALCULATED Legend

FROM LEGENDRE COEFFICIENTS, INTERVAL Legend

HALF TO CONVERGENCE. Legend

\*UPDATED BASED ON USER COMMENTS Legend

\*ADDED FORTRAN SAVE OPTION Legend

\*ADDED SELECTED OF DATA TO PROCESS Legend

BY MAT/MF/MT/ENERGY RANGES. Legend

\*WARNING...THE INPUT PARAMETER FORMAT Legend

HAS BEEN CHANGED - FOR DETAILS SEE Legend

BELOW. Legend

VERSION 92-2 (SEPT. 1992) \*CORRECTED PROCESSING OF ISOTROPIC Legend

ANGULAR DISTRIBUTIONS Legend

VERSION 94-1 (JANUARY 1994) \*VARIABLE ENDF/B DATA FILENAMES Legend

TO ALLOW ACCESS TO FILE STRUCTURES Legend

(WARNING - INPUT PARAMETER FORMAT Legend

HAS BEEN CHANGED) Legend

\*CLOSE ALL FILES BEFORE TERMINATING Legend

(SEE, SUBROUTINE ENDIT) Legend

VERSION 96-1 (JANUARY 1996) \*COMPLETE RE-WRITE Legend

\*IMPROVED COMPUTER INDEPENDENCE Legend

\*ALL DOUBLE PRECISION Legend

\*ON SCREEN OUTPUT Legend

\*UNIFORM TREATMENT OF ENDF/B I/O Legend

\*IMPROVED OUTPUT PRECISION Legend

\*INCREASED MAX. POINTS FROM 5,000 Legend

TO 20,000. Legend

VERSION 99-1 (MARCH 1999) \*CORRECTED CHARACTER TO FLOATING Legend

POINT READ FOR MORE DIGITS Legend

\*UPDATED TEST FOR ENDF/B FORMAT Legend

VERSION BASED ON RECENT FORMAT CHANGE Legend

\*GENERAL IMPROVEMENTS BASED ON Legend

USER FEEDBACK Legend

VERS. 2000-1 (FEBRUARY 2000)\*GENERAL IMPROVEMENTS BASED ON Legend

USER FEEDBACK Legend

VERS. 2001-1 (MARCH 2001) \*UPDATED TO HANDLE COMBINATIONS OF Legend

LEGENDRE COEFFICIENTS AT LOW ENERGY Legend

AND TABULATED DATA AT HIGH ENERGY. Legend

VERS. 2002-1 (MAY 2002) \*OPTIONAL INPUT PARAMETERS Legend

VERS. 2004-1 (MARCH 2004) \*ADDED INCLUDE FOR COMMON Legend

\*ZERO ANGULAR DISTRIBUTIONS ARE O.K. Legend

(PREVIOUSLY ZERO OR NEGATIVE WAS Legend

TREATED AS AN ERROR - ZERO IS O.K. Legend

FOR SOME REACTIONS OVER SOME COSINE Legend

RANGES) Legend

VERS. 2006-1 (MARCH 2006) \*INCREASED MAXIMUM NUMBER OF LEGENDRE Legend

COEFFICIENTS FROM 50 TO 500. Legend

WARNING - THE RECURSION RELATIONSHIP Legend

FOR LEGENDRE POLYNOMIALS BECOMES Legend

UNSTABLE IN HIGHER ORDER POLYTNOMIALS Legend

EVEN USING DOUBLE PRECISION. Legend

VERS. 2007-1 (JAN. 2007) \*CHECKED AGAINST ALL ENDF/B=VII. Legend

\*INCREASED MAX. POINTS FROM 60,000 Legend

TO 240,000. Legend

VERS. 2007-2 (MAY 2007) \*CORRECTED SIZE OF XMUBASE IN ANGLEN Legend

FOR INCREASED NUMBER OF COEFFICIENTS. Legend

VERS. 2010-1 (Apr. 2010) \*General update based on user feedback Legend

VERS. 2012-1 (Aug. 2012) \*added CODENAME Legend

\*32 and 64 bit Compatible Legend

\*Added ERROR stop Legend

VERS. 2015-1 (Jan. 2015) \*Extended OUT9 Legend

\*Replaced ALL 3 way IF Statements. Legend

Legend

OWNED, MAINTAINED AND DISTRIBUTED BY Legend

------------------------------------ Legend

THE NUCLEAR DATA SECTION Legend

INTERNATIONAL ATOMIC ENERGY AGENCY Legend

P.O. BOX 100 Legend

A-1400, VIENNA, AUSTRIA Legend

EUROPE Legend

Legend

ORIGINALLY WRITTEN BY Legend

------------------------------------ Legend

Dermott E. Cullen Legend

Legend

PRESENT CONTACT INFORMATION Legend

--------------------------- Legend

Dermott E. Cullen Legend

1466 Hudson Way Legend

Livermore, CA 94550 Legend

U.S.A. Legend

Telephone 925-443-1911 Legend

E. Mail RedCullen1@Comcast.net Legend

Website http://home.comcast.net/~redcullen1 Legend

Legend

PURPOSE Legend

------- Legend

CALCULATE LINEARLY INTERPOLABLE TABULATED ANGULAR DISTRIBUTIONS Legend

STARTING FROM DATA IN THE ENDF/B FORMAT. ANGULAR DISTRIBUTIONS Legend

MAY BE DESCRIBED IN THE ENDF/B FORMAT IN ONE OF THREE WAYS. Legend

FOR EACH OF THESE THREE FORMS THE USER MAY CHOOSE (SEE, INPUT Legend

OPTIONS) TO EITHER COPY EACH TYPE OF DATA OR TO PROCESS IT AT Legend

AS FOLLOWS, Legend

Legend

(1) ANGULAR DISTRIBUTION IS ISOTROPIC AT ALL ENERGIES (LTT=0) Legend

------------------------------------------------------------- Legend

IN THIS CASE THE INPUT DATA DOES NOT INCLUDE ANY ANGULAR Legend

DISTRIBUTIONS. A SECTION MERELY CONTAINS A FLAG TO INDICATE Legend

THE ANGULAR DISTRIBUTION IS ISOTROPIC AT ALL ENERGIES. IN THIS Legend

CASE THE SECTION IS OUTPUT IN EXACTLY THE SAME FORM IN WHICH IT Legend

WAS READ FROM THE INPUT. Legend

Legend

(2) ANGULAR DISTRIBUTIONS GIVEN BY LEGENDRE COEFFICIENTS (LTT=1) Legend

---------------------------------------------------------------- Legend

LEGENDRE COEFFICIENTS ARE GIVEN AT A SERIES OF ENERGIES. AN Legend

INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES. THE INTERPOLATION Legend

LAW BETWEEN ENERGIES IS COPIED AS INPUT (I.E., NO ATTEMPT IS Legend

MADE TO LINEARIZE THE VARIATION WITH ENERGY). FOR EACH ENERGY AT Legend

WHICH LEGENDRE COEFFICIENTS ARE GIVEN A LINEARLY INTERPOLABLE Legend

ANGULAR DISITRIBUTION IS RECONSTRUCTED IN THE SYSTEM IN WHICH THE Legend

THE COEFFICIENTS ARE GIVEN (I.E., CM OR LAB - NO ATTEMPT IS MADE Legend

TO CONVERT FROM ONE SYSTEM TO THE OTHER). A MAXIMUM OF 50 LEGENDRE Legend

COEFFICIENTS IS ALLOWED. REGARDLESS OF THE NUMBER OF COEFFICIENTS Legend

INPUT THE PROGRAM WILL ONLY USE COEFFICIENTS UP TO THE LAST ORDER Legend

AT WHICH THE COEFFICIENTS ARE NON-ZERO (E.G. IF COEFFICIENTS P1 Legend

THROUGH P12 ARE READ, BUT P9=P10=P11=P12=0.0, THE PROGRAM WILL Legend

ONLY USE COEFFICIENTS UP TO P8). IF OVER 50 NON-ZERO COEFFICIENTS Legend

ARE READ ONLY THE FIRST 50 WILL BE USED. Legend

Legend

(2) ANGULAR DISTRIBUTIONS IS TABULATED (LTT=2) Legend

---------------------------------------------------------------- Legend

ANGULAR DISTRIBUTIONS ARE GIVEN AT A SERIES OF ENERGIES. AN Legend

INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES AND A SECOND Legend

INTERPOLATION LAW IS GIVEN AT EACH ENERGY TO INTERPOLATE BETWEEN Legend

THE POINTS IN EACH TABULATED DISTRIBUTION. AT EACH ENERGY THE Legend

ANGULAR DISTRIBUTION WILL BE CONVERTED TO LINEARLY INTERPOLABLE Legend

FORM. THE INTERPOLATION BETWEEN ENERGIES IS OUTPUT EXACTLY AS Legend

INPUT. THE INTERPOLATION LAW AT EACH ENERGY IS OUTPUT TO INDICATE Legend

THE NOW LINEARLY INTERPOLABLE ANGULAR DISTRIBUTION. Legend

Legend

(3) LEGENDRE COEFFICIENTS AND TABULATED (LTT=3) Legend

---------------------------------------------------------------- Legend

ENDF-102 SAYS THIS SHOULD BE LTT=4, BUT ALL OF THE EVALUATIONS Legend

IN ENDF/B-VI, RELEASE 7, USE LTT=3? THIS CODE WILL TREAT THESE Legend

AS LTT=4 - SEE BELOW. Legend

Legend

(4) LEGENDRE COEFFICIENTS AND TABULATED (LTT=4) Legend

---------------------------------------------------------------- Legend

THIS IS A COMBINATION OF (1) AND (2) DESCRIBED ABOVE. THE Legend

LEGENDRE DATA IS ALWAYS GIVEN FIRST, FOR LOWER ENERGIES, Legend

FOLLOWED BY TABULATED ANGULAR DISTRIBUTIONS, FOR HIGHER ENERGIES. Legend

Legend

THIS TYPE OF DATA CAN ONLY BE COPIED OR ALL CONVERTED TO Legend

TABULATED (LTT=2). Legend

Legend

POINT VALUES - NORMALIZED VS. UNNORMALIZED Legend

------------------------------------------------------------------ Legend

THE VALUE OF AN ANGULAR DISTRIBUTION AT ANY COSINE WILL BE Legend

CORRECTLY CALCULATED BY THIS CODE, BASED EITHER DIRECTLY ON THE Legend

ANGULAR DISTRIBUTION, OR ON THE SUM OF THE CONTRIBUTING LEGENDRE Legend

MOMENTS. Legend

Legend

ENDF/B ANGULAR DISTRIBUTIONS ARE BY DEFINITION NORMALIZED WHEN Legend

INTEGRATED OVER COSINE. THEREFORE THIS CODE WILL NORMALIZE EACH Legend

ANGULAR DISTRIBUTION BEFORE IT IS OUTPUT. THE OUTPUT REPORT FROM Legend

THIS CODE WILL INDICATE THE NORMALIZATION FACTOR USED. Legend

Legend

THE REASON THAT AN ANGULAR DISTRIBUTION MAY NOT BE NORMALIZED IS Legend

DUE TO THE APPROXIMATION OF CREATING LINEARLY INTERPOLABLE Legend

TABULATED ANGULAR DISTRIBUTIONS - THE MORE ACCURATELY THIS IS Legend

DONE THE CLOSER THE NORMALIZATION FACTOR WILL BE TO UNITY. AS YOU Legend

DECREASE THE ALLOWABLE ERROR THE NORMALIZED VALUES WILL APPROACH Legend

THE CORRECT POINT VALUES CALCULATED BY THE CODE. Legend

Legend

SINCE THE DATA IS NORMALIZED PRIOR TO OUTPUT THE RESULTS IN THE Legend

ENDF/B FORMAT MAY DIFFER SLIGHTLY FROM VALUES REFERRED TO BE ERROR Legend

MESSAGES, ETC. PRINTED BY THE CODE DURING EXECUTION. IN ALL CASES Legend

THE VALUES PRINTED BY THE CODE IN ERROR MESSAGES, ETC. SHOULD BE Legend

CONSIDERED TO BE THE CORRECT VALUES AND THE OUTPUT TABULATED Legend

ANGULAR DISTRIBUTIONS APPROXIMATE DUE TO THE RE-NORMALIZATION - Legend

TO RE-ITERATE, THE OUTPUT TABULATED VALUES ARE APPROXIMATE DUE Legend

TO THE APPROXIMATIONS USED IN CONSTRUCTING LINEAR INTERPOLABLE Legend

ANGULAR DISTRIBUTIONS TO WITHIN SOME ALLOWABLE TOLERANCE. Legend

Legend

ELIMINATION OF NEGATIVE VALUES Legend

------------------------------ Legend

THE RECONSTRUCTED ANGULAR DISTRIBUTION WILL BE TESTED AND IF IT Legend

IS NEGATIVE AT ONE OR MORE COSINES AN ERROR MESSAGE WILL BE OUTPUT Legend

AND BASED ON THE INPUT OPTION SELECTED ONE OF THE FOLLOWING Legend

CORRECTIVE ACTIONS WILL BE TAKEN (SEE, INPUT OPTIONS), Legend

(1) NO CORRECTION Legend

(2) CHANGE INDIVIDUAL LEGENDRE COEFFICIENTS (EACH BY LESS THAN Legend

1.0 PER-CENT) UNTIL THE RECONSTRUCTED ANGULAR DISTRIBUTION Legend

IS POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). THE ALLOWABLE Legend

PER-CENT CHANGE IN COEFFICIENTS AND MINIMUM CROSS SECTION CAN Legend

BE CHANGED BY INPUT. Legend

(3) CHANGE ALL LEGENDRE COEFFICIENTS TO FORCE DISTRIBUTION TO BE Legend

POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). WITH THIS OPTION Legend

THERE IS NO RESTRICTION ON THE AMOUNT THAT EACH COEFFICIENT Legend

IS CHANGED AND AS SUCH THIS OPTION SHOULD BE USED WITH Legend

CAUTION AND ONLY AS A LAST RESORT IF NO OTHER APPROACH CAN Legend

BE USED TO MAKE THE DISTRIBUTION POSITIVE. Legend

Legend

OUTPUT Legend

------ Legend

THE USER MAY REQUEST OUTPUT OF EITHER, Legend

(1) TABULATED VALUES - POSSIBLY CORRECTED TO ELIMINATE NEGATIVE Legend

VALUES. THE TABULATED DISTRIBUTION WILL BE NORMALIZED BEFORE Legend

OUTPUT. Legend

(2) LEGENDRE COEFFICIENTS - POSSIBLY CORRECTED TO ELIMINATE Legend

NEGATIVE VALUES AND WITHOUT HIGHER ORDER ZERO COEFFICIENTS. Legend

BY DEFINITION DISTRIBUTIONS DEFINED BY LEGENDRE COEFFICIENTS Legend

ARE NORMALIZED TO UNITY. Legend

Legend

(3) ANGULAR DISTRIBUTIONS GIVEN BY A TABULATION (LTT=2) Legend

------------------------------------------------------- Legend

TABULATED ANGULAR DISTRIBUTIONS ARE GIVEN AT A SERIES OF ENERGIES. Legend

AN INTERPOLATION LAW IS GIVEN BETWEEN ENERGIES. THE INTERPOLATION Legend

LAW BETWEEN ENERGIES IS COPIED AS INPUT (I.E., NO ATTEMPT IS Legend

MADE TO LINEARIZE THE VARIATION WITH ENERGY). FOR EACH ENERGY AT Legend

AT WHICH TABULATED DATA ARE GIVEN A LINEARLY INTERPOLABLE ANGULAR Legend

DISTRIBUTION IS CONSTRUCTED IN THE SYSTEM IN WHICH THE TABULATED Legend

DATA ARE GIVEN (I.E., CM OR LAB - NO ATTEMPT IS MADE TO CONVERT Legend

FROM ONE SYSTEM TO THE OTHER). A MAXIMUM OF 60000 POINTS IS ALLOWE Legend

TO REPRESENT THE ANGULAR DISTRIBUTION AT EACH ENERGY. Legend

Legend

ELIMINATION OF NEGATIVE VALUES Legend

------------------------------ Legend

THE RECONSTRUCTED ANGULAR DISTRIBUTION WILL BE TESTED AND IF IT Legend

IS NEGATIVE AT ONE OR MORE COSINES AN ERROR MESSAGE WILL BE OUTPUT Legend

AND BASED ON THE INPUT OPTION SELECTED ONE OF THE FOLLOWING Legend

CORRECTIVE ACTIONS WILL BE TAKEN (SEE, INPUT OPTIONS), Legend

(1) NO CORRECTION Legend

(2) CHANGE ALL TABULATED VALUES TO FORCE DISTRIBUTION TO BE Legend

POSITIVE (MINIMUM MORE THAN 1 MILLI-BARN). THE MINIMUM VALUE Legend

MAY BE CHANGED BY INPUT. WITH THIS OPTION THERE IS NO Legend

RESTRICTION ON THE AMOUNT THAT EACH VALUE IS CHANGED AND AS Legend

SUCH THIS OPTION SHOULD BE USED WITH CAUTION AND ONLY AS A Legend

LAST RESORT IF NO OTHER APPROACH CAN BE USED TO MAKE THE Legend

DISTRIBUTION POSITIVE. Legend

Legend

OUTPUT Legend

------ Legend

THE OUTPUT WILL BE THE LINEARIZED ANGULAR DISTRIBUTION. THE Legend

TABULATED DISTRIBUTION WILL BE NORMALIZED TO UNITY BEFORE OUTPUT. Legend

Legend

CORRECTING NEGATIVE ANGULAR DISTRIBUTION Legend

---------------------------------------- Legend

IF AN ANGULAR DISTRIBUTION IS NEGATIVE AN ERROR MESSAGE WILL BE Legend

PRINTED AND THE USER MAY DECIDE (BASED ON INPUT OPTION) TO, Legend

(1) NOT PERFORM ANY CORRECTIVE ACTION. Legend

(2) FOR TABULATED DISTRIBUTIONS - ADD THE SAME VALUE TO EACH POINT Legend

VALUE SUCH THAT WHEN THE DISTRIBUTION IS RE-NORMALIZED THE Legend

MINIMUM VALUE IS 0.001 (1 MILLI-BARN). THE MINIMUM VALUE CAN Legend

BE CHANGED BY INPUT. WARNING...EXCEPT FOR SELECTION OF THE Legend

MINIMUM VALUE (BY INPUT) THE USER HAS NO CONTROL OVER HOW Legend

MUCH THE DISTRIBUTION IS CHANGED. THEREFORE THIS OPTION SHOULD Legend

BE USED WITH CAUTION. Legend

(3) FOR LEGENDRE COEFFICIENTS ONE OF TWO OPTIONS MAY BE SELECTED, Legend

(A) CHANGE INDIVIDUAL COEFFICIENTS (NO ONE COEFFICIENT BY MORE Legend

THAN 1 PER-CENT) TO MAKE THE DISTRIBUTION POSITIVE WITH A Legend

MINIMUM VALUE OF 0.001 (1 MILLI-BARN). THE MAXIMUM PER-CENT Legend

CHANGE IN EACH COEFFICIENT AND MINIMUM VALUE MAY BE CHANGED Legend

BY INPUT. INPUT THE PROGRAM CANNOT MAKE THE DISTRIBUTION Legend

POSITIVE BY CHANGING EACH COEFFICIENT BY UP TO THE MAXIMUM Legend

ALLOWABLE AMOUNT, THE ORIGINAL ANGULAR DISTRIBUTION OR Legend

COEFFICIENTS WILL BE OUTPUT. ONLY IN THE LATTER CASE SHOULD Legend

ONE CONSIDER USING OPTION (B) DESCRIBED BELOW. Legend

(B) LOGICALLY ADD THE SAME VALUE TO EACH POINT VALUE SUCH THAT Legend

WHEN THE DISTRIBUTION IS RE-NORMALIZED THE MINIMUM VALUE IS Legend

0.001 (1 MILLI-BARN). THIS IS EQUIVALENT AT INCREASING P0 Legend

BY A CERTAIN AMOUNT AND RE-NORMALIZATION IS EQUIVALENT TO THEN Legend

DIVIDING EACH COEFFICIENT BY A CERTAIN AMOUNT. THEREFORE, Legend

WHAT IS PHYSICALLY DONE BY THE PROGRAM IS TO DIVIDE EACH Legend

COEFFICIENT BY THE SAME AMOUNT. WARNING..EXCEPT FOR SELECTION Legend

OF THE MINIMUM VALUE (BY INPUT) THE USER HAS NO CONTROL OVER Legend

HOW MUCH THE DISTRIBUTION IS CHANGED. THEREFORE THIS OPTION Legend

SHOULD BE USED WITH CAUTION. Legend

Legend

WARNING MESSAGES FROM PROGRAM Legend

----------------------------- Legend

THE WARNING MESSAGES PRINTED BY THIS PROGRAM SHOULD ONLY BE Legend

CONSIDERED TO BE EXACTLY THAT..WARNINGS..NOT AN ABSOLUTE JUDGEMENT Legend

BY THIS PROGRAM THAT THERE IS SOMETHING WRONG WITH THE DATA. WHEN Legend

WARNING MESSAGES ARE PRINTED EXAMINE THE DATA AND EITHER TAKE NO Legend

ACTION (IF YOU FEEL THAT THE DATA IS O.K.) OR CORRECT THE DATA Legend

(IF YOU FEEL THAT THE DATA IS INCORRECT AND YOU CAN CORRECT IT). Legend

Legend

VALIDITY OF MODIFIED DATA Legend

------------------------- Legend

BEFORE BELIEVING AND USING DATA WHICH HAS BEEN MODIFIED (EITHER Legend

TABULATED ANGULAR DISTRIBUTIONS OR LEGENDRE COEFFICIENTS) THE USER Legend

SHOULD INSURE THAT THE MODIFIED DATA IS PHYSICALLY MORE ACCEPTABLE Legend

THAN THE ORIGINAL DATA. IN ORDER TO DO THIS ONE OR MORE OF THE Legend

FOLLOWING METHODS SHOULD BE USED, Legend

Legend

(1) USE THE ENERGY VARIATION TESTS BUILT-IN TO THIS PROGRAM AND Legend

EVALPLOT TO PLOT THE ENERGY DEPENDENCE OF THE LEGENDRE Legend

COEFFICIENTS IN ORDER TO IDENTIFY AND CORRECT (BY HAND...NOT Legend

BY THIS PROGRAM) ANY COEFFICIENTS WHICH HAVE UNREALISTIC Legend

ENERGY AND L ORDER VARIATIONS. THIS SHOULD ALWAYS BE DONE Legend

FIRST TO ELIMINATE MAJOR PROBLEMS BEFORE USING THIS PROGRAM Legend

TO AUTOMATICALLY MAKE MINOR CORRECTIONS. Legend

(1) OUTPUT AND PLOT THE UNCORRECTED AND CORRECTED ANGULAR Legend

DISTRIBUTIONS. COMPARE THE PLOTS TO INSURE THAT THE CORRECTED Legend

DATA DOES NOT SERIOUSLY CHANGE THE ENERGY DEPENDENCE OF THE Legend

ANGULAR DISTRIBUTION. Legend

(2) IF PLOTTING CAPABILITY IS NOT AVAIALABLE, USE THE PRINTED OUT Legend

OF THIS PROGRAM TO DETERMINE HOW MUCH THE TABULATED ANGULAR Legend

DISTRIBUTION OR LEGENDRE COEFFICIENTS HAVE BEEN MODIFIED. Legend

GENERALLY IF ONE COEFFICIENT HAS BEEN ONLY SLIGHTLY MODIFIED Legend

THE DISTRIBUTION WILL BE ACCEPTABLE. HOWEVER IF MANY Legend

COEFFICIENTS HAVE BEEN MODIFIED THE RESULT WILL NOT BE Legend

RELIABLE. Legend

Legend

SEEING ANGULAR DISTRIBUTIONS AND LEGENDRE COEFFICIENTS Legend

------------------------------------------------------ Legend

PROGRAM EVALPLOT CAN BE USED TO PLOT ANGULAR DISTRIBUTION AND Legend

LEGENDRE COEFFICIENTS - WHEN IT COMES TO CHECKING THIS TYPE OF Legend

DATA THERE IS NO SUBSTITUTE FOR PLOTS OF THE DATA TO MAKE THE Legend

JOB EASY AND STRAIGHTFORWARD. Legend

Legend

FOR LEGENDRE COEFFICIENTS EVALPLOT CAN BE USED TO SEE THE ENERGY Legend

DEPENDENCE OF EACH COEFFICIENT - THIS IS AN EXTREMELY EASY AND Legend

USEFUL WAY TO CHECK FOR ERRORS IN THE BASIC DATA. Legend

Legend

FOR ANGULAR DISTRIBUTION EVALPLOT CAN BE USED TO PLOT THEM AT Legend

EACH ENERGY THAT THEY ARE TABULATED - THIS IS ALSO AN EASY AND Legend

USEFUL WAY TO CHECK FOR ERRORS. Legend

Legend

I/O UNIT DEFINITIONS Legend

-------------------- Legend

UNIT DESCRIPTION Legend

---- ----------- Legend

2 INPUT CARDS Legend

3 OUTPUT REPORT Legend

10 ORIGINAL DATA IN ENDF/B FORMAT Legend

11 FINAL DATA IN ENDF/B FORMAT Legend

Legend

OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILIO1 AND FILIO2) Legend

--------------------------------------------------------------- Legend

UNIT FILE NAME Legend

---- ---------- Legend

2 LEGEND.INP Legend

3 LEGEND.LST Legend

10 ENDFB.IN Legend

11 ENDFB.OUT Legend

Legend

INPUT CARD Legend

---------- Legend

CARD COLS. FORMAT DESCRIPTION Legend

---- ----- ------ ----------- Legend

1 1-11 E11.4 FRACTIONAL THINNING CRITERIA Legend

12-22 I11 MAXIMUM NUMBER OF POINTS IN ANGULAR DISTRIBUTION Legend

RECONSTRUCTED FROM LEGENDRE COEFFICIENTS (PRESENT Legend

LIMITS ARE 11 TO 60000 POINTS) Legend

\*THIS OPTION CAN BE USED TO RUN QUICK, BUT NOT Legend

NECESSARILY SO ACCURATE CALCULATIONS - TO ROUGHLY Legend

SEE WHAT THE ANGULAR DISTRIBUTIONS LOOK LIKE. Legend

\*IT IS RECOMMENDED THAT YOU USE 0 AS INPUT - IN Legend

WHICH CASE THE PROGRAM WILL USE THE MAXIMUM Legend

ALLOWABLE NUMBER OF POINTS = 60000. Legend

23-33 I11 TABULATED ANGULAR DISTRIBUTION TREATMENT Legend

= 0 - COPY TABLES Legend

= 1 - LINEARIZE TABLES (OUTPUT TABLES) Legend

= 2 - LINEARIZE AND THIN TABLES (OUTPUT TABLES) Legend

34-44 I11 LEGENDRE COEFFICIENT TREATMENT Legend

= 0 - COPY LEGENDRE COEFFICIENTS Legend

= 1 - RECONSTRUCT TABULATED ANGULAR DISTRIBUTION. Legend

(OUTPUT TABLES). Legend

= 2 - RECONSTRUCT TABULATED ANGULAR DISTRIBUTION. Legend

(OUTPUT LEGENDRE COEFFICIENTS). Legend

45-55 I11 NEGATIVE ANGULAR DISTRIBUTION TREATMENT. Legend

= 0 - NO CORRECTION Legend

= 1 - TABULATE DATA - NO CORRECTION. Legend

- LEGENDRE DATA - CHANGE COEFFICIENTS Legend

(NONE BY MORE THAN 1.0 PER-CENT - CAN BE Legend

CHANGED BY INPUT). Legend

= 2 - FORCE DISTRIBUTIONS TO BE POSITIVE Legend

(TABULATED OR LEGENDRE DATA). Legend

56-66 I11 LEGENDRE COEFFICIENT VARIATION TEST FLAG. Legend

= 0 - TEST TESTS. Legend

= 1 - PERFORM TESTS, Legend

(A) LEGENDRE ORDER INCREASES WITH ENERGY. Legend

(C) MONOTONIC VARIATION OF COEFFICIENTS Legend

AS A FUNCTION OF ENERGY. Legend

(C) COEFFICIENTS DECREASE AS A FUNCTION OF Legend

LEGENDRE ORDER. Legend

2 1-60 60A1 ENDF/B INPUT DATA FILENAME Legend

(STANDARD OPTION = ENDFB.IN) Legend

3 1-60 60A1 ENDF/B OUTPUT DATA FILENAME Legend

(STANDARD OPTION = ENDFB.OUT) Legend

4-N 1- 6 I6 LOWER MAT LIMIT Legend

7- 8 I2 LOWER MF LIMIT Legend

9-11 I3 LOWER MT LIMIT Legend

12-17 I6 UPPER MAT LIMIT Legend

18-19 I2 UPPER MF LIMIT Legend

20-22 I3 UPPER MT LIMIT Legend

23-33 E11.4 LOWER ENERGY LIMIT Legend

34-44 E11.4 UPPER ENERGY LIMIT Legend

45-55 E11.4 MINIMUM ALLOWABLE VALUE OF ANGULAR DISTRIBUTION Legend

56-66 E11.4 ALLOWABLE FRACTION (NOT PER-CENT) CHANGE IN ANY Legend

ONE LEGENDRE COEFFICIENT TO MAKE THE ANGULAR Legend

DISTRIBUTION POSITIVE (AND AT LEAST EQUAL TO THE Legend

INPUT MINIMUM ALLOWABLE VALUE). Legend

Legend

\*UP TO 100 MAT/MT/E RANGES MAY BE INPUT, EACH SPECIFYING AN Legend

ALLOWABLE MINIMUM SIGMA AND MAXIMUM CHANGE IN COEFFICIENTS. Legend

\*INPUT IS TERMINATED BY A BLANK CARD. Legend

\*ALL MAY/MT/E RANGES NOT SPECIFIED BY INPUT WILL BE TREATED BY Legend

ALLOWING A MINIMUM SIGMA OF 0.001 (1 MILLI-BARN) AND A CHANGE Legend

IN EACH COEFFICIENT BY UP TO 0.01 (1 PER-CENT). Legend

\*THESE MAT/MT/E RANGES ARE NOT USED TO CORRECT ALL ANGULAR Legend

DISTRIBUTIONS WHERE SIGMA IS LESS THAN THE MINIMUM. THEY ARE Legend

ONLY USED TO CORRECT DISTRIBUTION THAT ARE NEGATIVE AND TO Legend

INSURE THAT THE CROSS SECTION AT THE COSINES WHERE THE ANGULAR Legend

DISTRIBUTION ARE INITIALLY NEGATIVE ARE CORRECTED TO BE POSITIVE Legend

AND AT LEAST AS LARGE AS THE MINIMUM ALLOWABLE SIGMA (SPECIFIED Legend

BY INPUT). Legend

Legend

EXAMPLE INPUT NO. 1 Legend

------------------- Legend

PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN Legend

ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT Legend

AND OUTPUT UNCORRECTED TABULATED ANGULAR DISTRIBUTION USING Legend

A MAXIMUM OF 501 POINTS IN EACH TABULATED ANGULAR DISTRIBUTION. Legend

SINCE LEGENDRE COEFFICIENTS WILL NOT BE CORRECTED THE INPUT NEED Legend

NOT SPECIFY MAT/MT/E RANGES. Legend

Legend

READ /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT Legend

Legend

THE FOLLOWING 4 INPUT LINES ARE REQUIRED, Legend

Legend

1.00000- 3 501 2 1 0 Legend

/ENDFB6/K300/LEAD.IN Legend

/ENDFB6/K300/LEAD.OUT Legend

(BLANK CARD TERMINATED INPUT) Legend

Legend

EXAMPLE INPUT NO. 2 Legend

------------------- Legend

PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN Legend

ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT Legend

AND OUTPUT CORRECTED TABULATED ANGULAR DISTRIBUTION (ONLY THOSE Legend

RE-CONSTRUCTED FROM LEGENDRE COEFFICIENTS WILL BE CORRECTED). Legend

FOR ALL MAT/MT/E CORRECT NEGATIVE ANGULAR DISTRIBUTION TO A VALUE Legend

OF 0.01 (10 MILLI-BARNS) AND ALLOW LEGENDRE COEFFICIENTS TO BE Legend

CHANGED BY UP TO 0.02 (2 PER-CENT). Legend

Legend

USE THE DEFAULT FILENAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE Legend

DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK). Legend

Legend

THE FOLLOWING 5 INPUT LINES ARE REQUIRED, Legend

Legend

1.00000- 3 501 2 1 1 Legend

Legend

Legend

1 1 1 999999999 0.00000+ 0 3.00000+ 7 1.00000- 2 2.00000- 2 Legend

(BLANK CARD TERMINATED INPUT) Legend

Legend

EXAMPLE INPUT NO. 3 Legend

------------------- Legend

PROCESS BOTH LEGENDRE COEFFICIENTS AND TABULATED DATA TO OBTAIN Legend

ANGULAR DISTRIBUTION WHICH ARE ACCURATE TO WITHIN 0.1 PER-CENT Legend

AND OUTPUT CORRECTED LEGENDRE COEFFICIENTS AND UNCORRECTED Legend

TABULATED ANGULAR DISTRIBUTIONS. FOR MAT=1800, MT=2 CORRECT Legend

NEGATIVE ANGULAR DISTRIBUTIONS TO INSURE THE MINIMUM IS 0.01 Legend

(10 MILLI-BARNS) ALLOWING EACH LEGENDRE COEFFICIENT TO CHANGE BY Legend

UP TO 0.02 (2 PER-CENT). ALL OTHER MAT/MT/E WILL BE CORRECTED Legend

TO A MINIMUM OF 0.001 (1 MILLI-BARN) ALLOWING A 0.01 (1 PER-CENT) Legend

CHANGE (BUILT-IN OPTION). Legend

Legend

READ /ENDFB6/K300/LEAD.IN AND WRITE /ENDFB6/K300/LEAD.OUT Legend

Legend

THE FOLLOWING 5 INPUT LINES ARE REQUIRED, Legend

Legend

1.00000- 3 501 2 2 1 Legend

/ENDFB6/K300/LEAD.IN Legend

/ENDFB6/K300/LEAD.OUT Legend

1800 4 2 1800 4 2 0.00000+ 0 3.00000+ 7 1.00000- 2 2.00000- 2 Legend

(BLANK CARD TERMINATED INPUT) Legend

Legend

EXAMPLE INPUT NO. 4 Legend

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TO COPY TABULATED ANGULAR DISTRIBUTION AND CONVERT LEGENDRE Legend

COEFFICIENTS TO UNCORRECTED TABULAR DISTRIBUTIONS. Legend

Legend

USE THE DEFAULT FILENAMES ENDFB.IN AND ENDFB.OUT (THIS CAN BE Legend

DONE BY LEAVING THE SECOND AND THIRD INPUT LINES BLANK). Legend

Legend

THE FOLLOWING 4 INPUT LINES ARE REQUIRED, Legend

Legend

1.00000- 3 501 0 1 0 Legend

Legend

Legend

(BLANK CARD TERMINATED INPUT) Legend

Legend

======================================================================= Legend