======================================================================= Linear

Linear

PROGRAM LINEAR Linear

============== Linear

VERSION 74-1 (MAY 1974) Linear

VERSION 75-1 (APRIL 1975) Linear

VERSION 76-2 (OCTOBER 1976) Linear

VERSION 77-1 (JANUARY 1977) Linear

VERSION 78-1 (JULY 1978) Linear

VERSION 79-1 (JULY 1979) CDC-7600 AND CRAY-1 VERSION. Linear

VERSION 80-1 (MAY 1980) IBM, CDC AND CRAY VERSION. Linear

VERSION 80-2 (DECEMBER 1980) Linear

VERSION 81-1 (MARCH 1981) Linear

VERSION 82-1 (JANUARY 1982) IMPROVED COMPUTER COMPATIBILITY. Linear

VERSION 83-1 (JANUARY 1983) \*MAJOR RE-DESIGN. Linear

\*PAGE SIZE INCREASED - 1002 TO 3006. Linear

\*ELIMINATED COMPUTER DEPENDENT CODING. Linear

\*NEW, MORE COMPATIBLE I/O UNIT NUMBER. Linear

\*ADDED OPTION TO KEEP ALL ORIGINAL Linear

ENERGY POINTS FROM EVALUATION. Linear

\*ADDED STANDARD ALLOWABLE ERROR OPTION Linear

(CURRENTLY 0.1 PER-CENT). Linear

VERSION 83-2 (OCTOBER 1983) IMPROVED BASED ON USER COMMENTS. Linear

VERSION 84-1 (APRIL 1984) IMPROVED BASED ON USER COMMENTS. Linear

VERSION 84-2 (JUNE 1984) \*UPDATED FOR ENDF/B-VI FORMATS. Linear

\*SPECIAL I/O ROUTINES TO GUARANTEE Linear

ACCURACY OF ENERGY. Linear

\*DOUBLE PRECISION TREATMENT OF ENERGY Linear

(REQUIRED FOR NARROW RESONANCES). Linear

VERSION 85-1 (AUGUST 1985) \*FORTRAN-77/H VERSION Linear

VERSION 86-1 (JANUARY 1986)\*ENDF/B-VI FORMAT Linear

VERSION 87-1 (JANUARY 1987)\*DOUBLE PRECISION TREATMENT OF CROSS Linear

SECTION Linear

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

FILE NAMES (SEE, SUBROUTINE FILEIO Linear

FOR DETAILS). Linear

\*IMPROVED BASED ON USER COMMENTS. Linear

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

INSURE PROGRAM WILL NOT DO ANYTHING Linear

CRAZY. Linear

\*UPDATED TO USE NEW PROGRAM CONVERT Linear

KEYWORDS. Linear

\*ADDED LIVERMORE CIVIC COMPILER Linear

CONVENTIONS. Linear

VERSION 90-1 (JUNE 1990) \*EXTENDED TO LINEARIZE PHOTON Linear

INTERACTION DATA, MF=23 AND 27 Linear

\*ADDED FORTRAN SAVE OPTION Linear

\*UPDATED BASED ON USER COMMENTS. Linear

\*NEW MORE CONSISTENT ENERGY OUTPUT Linear

ROUTINE. Linear

\*WARNING...INPUT PARAMETER FORMAT Linear

HAS BEEN CHANGED...SEE DESCRIPTION Linear

BELOW. Linear

VERSION 91-1 (JULY 1991) \*ADDED INTERPOLATION LAW 6 - ONLY USED Linear

FOR CHARGED PARTICLE CROSS SECTIONS Linear

FOR COULOMB PENETRABILITIES. Linear

VERSION 92-1 (JANUARY 1992)\*ADDED NU-BAR (TOTAL, DELAYED, PROMPT) Linear

POLYNOMIAL OR TABULATED ALL CONVERTED Linear

TO LINEARLY INTERPOLABLE Linear

\*INCREASED PAGE SIZE FROM 3006 TO 5010 Linear

POINTS. Linear

\*ALL ENERGIES INTERNALLY ROUNDED PRIOR Linear

TO CALCULATIONS. Linear

\*COMPLETELY CONSISTENT I/O AND ROUNDING Linear

ROUTINES - TO MINIMIZE COMPUTER Linear

DEPENDENCE. Linear

VERSION 92-2 (JULY 1992) \*CORRECTED CONVERSION OF NU-BAR FROM Linear

POLYNOMIAL TO TABULATED - COPY Linear

SPONTANEOUS NU-BAR (BY DEFINITION Linear

THE SPONTANEOUS NU-BAR IS NOT AN Linear

ENERGY DEPENDENT QUANTITY). Linear

VERSION 93-1 (MARCH 1993) \*UPDATED FOR USE WITH LAHEY COMPILER Linear

ON IBM-PCS. Linear

\*INCREASED PAGE SIZE FROM 5010 TO Linear

30000 POINTS Linear

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

TO ALLOW ACCESS TO FILE STRUCTURES Linear

(WARNING - INPUT PARAMETER FORMAT Linear

HAS BEEN CHANGED) Linear

\*CLOSE ALL FILES BEFORE TERMINATING Linear

(SEE, SUBROUTINE ENDIT) Linear

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

\*IMPROVED COMPUTER INDEPENDENCE Linear

\*ALL DOUBLE PRECISION Linear

\*ON SCREEN OUTPUT Linear

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

\*IMPROVED OUTPUT PRECISION Linear

\*DEFINED SCRATCH FILE NAMES Linear

\*ALWAYS INCLUDE THERMAL VALUE Linear

\*INCREASED PAGE SIZE FROM 30000 TO Linear

60000 POINTS Linear

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

POINT READ FOR MORE DIGITS Linear

\*UPDATED TEST FOR ENDF/B FORMAT Linear

VERSION BASED ON RECENT FORMAT CHANGE Linear

\*GENERAL IMPROVEMENTS BASED ON Linear

USER FEEDBACK Linear

VERSION 99-2 (JUNE 1999) \*ASSUME ENDF/B-VI, NOT V, IF MISSING Linear

MF=1, MT-451. Linear

VERS. 2000-1 (FEBRUARY 2000)\*ADDED MF = 9 AND 10 LINEARIZATION Linear

\*GENERAL IMPROVEMENTS BASED ON Linear

USER FEEDBACK Linear

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

VERS. 2004-1 (JAN. 2004) \*GENERAL UPDATE BASED ON USER FEEDBACK Linear

VERS. 2005-1 (JAN. 2005) \*ALWAYS KEEP ORIGINAL TABULATED Linear

NU-BAR POINTS. Linear

VERS. 2006-1 (FEB. 2006) \*CORRECTED INT=6 NEAR THRESHOLD Linear

\*NO SUBDIVIDE BELOW MINIMUM XCMIN Linear

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

\*INCREASED PAGE SIZE FROM 60,000 TO Linear

600,000 POINTS Linear

VERS. 2007-2 (DEC. 2007) \*72 CHARACTER FILE NAMES. Linear

VERS. 2010-1 (Apr. 2010) \*Skipped leading cross section = 0 Linear

up to effective start, unless keeping Linear

ALL original energy points. Linear

\*Replaced ETHRES by ESTART - it is Linear

not a threshold - just a minimum Linear

energy - if a section starts above Linear

this energy with a positive cross Linear

section, an additional point will Linear

inserted with cross section = 0. Linear

VERS. 2012-1 (Aug. 2012) \*Minor Updates based on User Feedback. Linear

\*Added CODENAME Linear

\*32 and 64 bit Compatible Linear

\*Added ERROR stops. Linear

VERS. 2012-2 (Nov. 2012) \*Never thin nu-bar. Linear

VERS. 2013-1 (Nov. 2013) \*Extended OUT9. Linear

VERS. 2015-1 (Jan. 2015) \*Allow Imaginary Anomolous Scattering Linear

Factor to be Negative (MF/MT=27/506). Linear

\*Replaced ALL 3 way IF Statements. Linear

Linear

OWNED, MAINTAINED AND DISTRIBUTED BY Linear

------------------------------------ Linear

THE NUCLEAR DATA SECTION Linear

INTERNATIONAL ATOMIC ENERGY AGENCY Linear

P.O. BOX 100 Linear

A-1400, VIENNA, AUSTRIA Linear

EUROPE Linear

Linear

ORIGINALLY WRITTEN BY Linear

------------------------------------ Linear

Dermott E. Cullen Linear

Linear

PRESENT CONTACT INFORMATION Linear

--------------------------- Linear

Dermott E. Cullen Linear

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Livermore, CA 94550 Linear

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Linear

AUTHORS MESSAGE Linear

--------------- Linear

THE REPORT DESCRIBED ABOVE IS THE LATEST PUBLISHED DOCUMENTATION Linear

FOR THIS PROGRAM. HOWEVER, THE COMMENTS BELOW SHOULD BE CONSIDERED Linear

THE LATEST DOCUMENTATION INCLUDING ALL RECENT IMPROVEMENTS. PLEASE Linear

READ ALL OF THESE COMMENTS BEFORE IMPLEMENTATION. Linear

Linear

AT THE PRESENT TIME WE ARE ATTEMPTING TO DEVELOP A SET OF COMPUTER Linear

INDEPENDENT PROGRAMS THAT CAN EASILY BE IMPLEMENTED ON ANY ONE Linear

OF A WIDE VARIETY OF COMPUTERS. IN ORDER TO ASSIST IN THIS PROJECT Linear

IT WOULD BE APPECIATED IF YOU WOULD NOTIFY THE AUTHOR OF ANY Linear

COMPILER DIAGNOSTICS, OPERATING PROBLEMS OR SUGGESTIONS ON HOW TO Linear

IMPROVE THIS PROGRAM. HOPEFULLY, IN THIS WAY FUTURE VERSIONS OF Linear

THIS PROGRAM WILL BE COMPLETELY COMPATIBLE FOR USE ON YOUR Linear

COMPUTER. Linear

Linear

PURPOSE Linear

------- Linear

THIS PROGRAM IS DESIGNED TO CONVERT ENDF/B FILE 3, 23 AND 27 DATA Linear

TO LINEAR-LINEAR INTERPOLABLE FORM. ANY SECTION THAT IS ALREADY Linear

LINEAR-LINEAR INTERPOLABLE WILL BE THINNED. Linear

Linear

IN THE FOLLOWING DISCUSSION FOR SIMPLICITY THE ENDF/B TERMINOLOGY Linear

---ENDF/B TAPE---WILL BE USED. IN FACT THE ACTUAL MEDIUM MAY BE Linear

TAPE, CARDS, DISK OR ANY OTHER MEDIUM. Linear

Linear

ENDF/B FORMAT Linear

------------- Linear

THIS PROGRAM ONLY USES THE ENDF/B BCD OR CARD IMAGE FORMAT (AS Linear

OPPOSED TO THE BINARY FORMAT) AND CAN HANDLE DATA IN ANY VERSION Linear

OF THE ENDF/B FORMAT (I.E., ENDF/B-I, II,III, IV, V OR VI FORMAT). Linear

Linear

IT IS ASSUMED THAT THE DATA IS CORRECTLY CODED IN THE ENDF/B Linear

FORMAT AND NO ERROR CHECKING IS PERFORMED. IN PARTICULAR IT IS Linear

ASSUMED THAT THE MAT, MF AND MT ON EACH LINE IS CORRECT. SEQUENCE Linear

NUMBERS (COLUMNS 76-80) ARE IGNORED ON INPUT, BUT WILL BE Linear

CORRECTLY OUTPUT ON ALL LINES. THE FORMAT OF SECTION MF=1, MT=451 Linear

AND ALL SECTIONS OF MF=3 MUST BE CORRECT. THE PROGRAM COPIES ALL Linear

OTHER SECTION OF DATA AS HOLLERITH AND AS SUCH IS INSENSITIVE TO Linear

THE CORRECTNESS OR INCORRECTNESS OF ALL OTHER SECTIONS. Linear

Linear

OUTPUT FORMAT Linear

------------- Linear

IN THIS VERSION OF LINEAR ALL ENERGIES WILL BE OUTPUT IN Linear

F (INSTEAD OF E) FORMAT IN ORDER TO ALLOW ENERGIES TO BE WRITTEN Linear

WITH UP TO 9 DIGITS OF ACCURACY. IN PREVIOUS VERSIONS THIS WAS AN Linear

OUTPUT OPTION. HOWEVER USE OF THIS OPTION TO COMPARE THE RESULTS Linear

OF ENERGIES WRITTEN IN THE NORMAL ENDF/B CONVENTION OF 6 DIGITS Linear

TO THE 9 DIGIT OUTPUT FROM THIS PROGRAM DEMONSTRATED THAT FAILURE Linear

TO USE THE 9 DIGIT OUTPUT CAN LEAD TO LARGE ERRORS IN THE DATA Linear

DUE TO TRUNCATION OF ENERGIES TO 6 DIGITS DURING OUTPUT. Linear

Linear

CONTENTS OF OUTPUT Linear

------------------ Linear

ENTIRE EVALUATIONS ARE OUTPUT, NOT JUST THE LINEARIZED DATA Linear

CROSS SECTIONS, E.G. ANGULAR AND ENERGY DISTRIBUTIONS ARE ALSO Linear

INCLUDED. Linear

Linear

DOCUMENTATION Linear

------------- Linear

THE FACT THAT THIS PROGRAM HAS OPERATED ON THE DATA IS DOCUMENTED Linear

BY THE ADDITION OF 3 COMMENT LINES AT THE END OF EACH HOLLERITH Linear

SECTION IN THE FORM Linear

Linear

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* PROGRAM LINEAR (2015-1) \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Linear

FOR ALL DATA GREATER THAN 1.00000-10 IN ABSOLUTE VALUE Linear

DATA LINEARIZED TO WITHIN AN ACCURACY OF 0.1 PER-CENT Linear

Linear

THE ORDER OF SIMILAR COMMENTS (FROM RECENT, SIGMA1 AND GROUPIE) Linear

REPRESENTS A COMPLETE HISTORY OF ALL OPERATIONS PERFORMED ON Linear

THE DATA BY THESE PROGRAMS. Linear

Linear

THESE COMMENT LINES ARE ONLY ADDED TO EXISTING HOLLERITH SECTIONS, Linear

I.E., THIS PROGRAM WILL NOT CREATE A HOLLERITH SECTION. THE FORMAT Linear

OF THE HOLLERITH SECTION IN ENDF/B-V DIFFERS FROM THE THAT OF Linear

EARLIER VERSIONS OF ENDF/B. BY READING AN EXISTING MF=1, MT=451 Linear

IT IS POSSIBLE FOR THIS PROGRAM TO DETERMINE WHICH VERSION OF Linear

THE ENDF/B FORMAT THE DATA IS IN. WITHOUT HAVING A SECTION OF Linear

MF=1, MT=451 PRESENT IT IS IMPOSSIBLE FOR THIS PROGRAM TO Linear

DETERMINE WHICH VERSION OF THE ENDF/B FORMAT THE DATA IS IN, AND Linear

AS SUCH IT IS IMPOSSIBLE FOR THE PROGRAM TO DETERMINE WHAT FORMAT Linear

SHOULD BE USED TO CREATE A HOLLERITH SECTION. Linear

Linear

REACTION INDEX Linear

-------------- Linear

THIS PROGRAM DOES NOT USE THE REACTION INDEX WHICH IS GIVEN IN Linear

SECTION MF=1, MT=451 OF EACH EVALUATION. Linear

Linear

THIS PROGRAM DOES NOT UPDATE THE REACTION INDEX IN MF=1, MT=451. Linear

THIS CONVENTION HAS BEEN ADOPTED BECAUSE MOST USERS DO NOT Linear

REQUIRE A CORRECT REACTION INDEX FOR THEIR APPLICATIONS AND IT WAS Linear

NOT CONSIDERED WORTHWHILE TO INCLUDE THE OVERHEAD OF CONSTRUCTING Linear

A CORRECT REACTION INDEX IN THIS PROGRAM. HOWEVER, IF YOU REQUIRE Linear

A REACTION INDEX FOR YOUR APPLICATIONS, AFTER RUNNING THIS PROGRAM Linear

YOU MAY USE PROGRAM DICTIN TO CREATE A CORRECT REACTION INDEX. Linear

Linear

SECTION SIZE Linear

------------ Linear

SINCE THIS PROGRAM USES A LOGICAL PAGING SYSTEM THERE IS NO LIMIT Linear

TO THE NUMBER OF POINTS IN ANY SECTION, E.G., THE TOTAL CROSS Linear

SECTION MAY BE REPRESENTED BY 200,000 DATA POINTS. Linear

Linear

FOR ANY LINEARIZED SECTION THAT CONTAINS 60000 OR FEWER POINTS Linear

THE ENTIRE OPERATION WILL BE PERFORMED IN CORE AND THE LINEARIZED Linear

DATA WILL BE OUTPUT DIRECTLY TO THE ENDF/B FORMAT. FOR ANY SECTION Linear

THAT CONTAINS MORE POINTS THE DATA WILL BE LINEARIZED A PAGE AT A Linear

TIME (1 PAGE = 60000 POINTS) AND OUTPUT TO SCRATCH. AFTER THE Linear

ENTIRE SECTION HAS BEEN LINEARIZED THE DATA WILL BE READ BACK FROM Linear

SCRATCH AND OUTPUT TO THE ENDF/B FORMAT. Linear

Linear

SELECTION OF DATA Linear

----------------- Linear

THE PROGRAM SELECTS DATA TO BE LINEARIZED BASED EITHER ON EITHER Linear

MAT (ENDF/B MAT NO.) OR ZA AS WELL AS MF AND MT NUMBERS. THIS Linear

PROGRAM ALLOWS UP TO 100 MAT/MF/MT OR ZA/MF/MT RANGES TO BE Linear

SPECIFIED BY INPUT PARAMETERS. THE PROGRAM WILL ASSUME THAT THE Linear

ENDF/B TAPE IS IN MAT ORDER, REGARDLESS OF THE CRITERIA USED Linear

TO RETRIEVE MATERIALS. IF RETRIEVAL IS BY MAT RANGE THE PROGRAM Linear

WILL TERMINATE WHEN A MAT IS FOUND THAT IS ABOVE ALL REQUESTED Linear

MAT RANGES. IF RETRIEVAL IS BY ZA RANGE THE PROGRAM WILL SEARCH Linear

THE ENTIRE ENDF/B TAPE. Linear

Linear

PROGRAM OPERATION Linear

----------------- Linear

EACH SECTION OF DATA IS CONSIDERED SEPARATELY. EACH SECTION OF Linear

ENDF/B DATA TO LINEARIZE IS REPRESENTED BY A TABLE OF ENERGY Linear

VS. CROSS SECTION AND ANY ONE OF FIVE ALLOWABLE INTERPOLATION LAWS Linear

BETWEEN ANY TWO TABULATED POINTS. THIS PROGRAM WILL REPLACE EACH Linear

SECTION OF DATA CROSS SECTIONS BY A NEW TABLE OF ENERGY VS. Linear

CROSS SECTION IN WHICH THE INTERPOLATION LAW IS ALWAYS LINEAR IN Linear

ENERGY AND CROSS SECTION BETWEEN ANY TWO TABULATED POINTS. Linear

Linear

DATA IS READ AND LINEARIZED A PAGE AT A TIME (ONE PAGE CONTAINS Linear

60000 DATA POINTS). IF THE FINAL LINEARIZED SECTION CONTAINS TWO Linear

PAGES OR LESS, DATA POINTS IT WILL BE ENTIRELY CORE RESIDENT Linear

AFTER IT HAS BEEN LINEARIZED AND WILL BE WRITTEN DIRECTLY FROM Linear

CORE TO THE OUTPUT TAPE. IF THE LINEARIZED SECTION IS LARGER THAN Linear

TWO PAGES, AFTER EACH PAGE IS LINEARIZED IT WILL BE WRITTEN TO Linear

SCRATCH. AFTER THE ENTIRE SECTION HAS BEEN LINEARIZED IT WILL Linear

BE READ BACK FROM SCRATCH, TWO PAGES AT A TIME, AND WRITTEN TO Linear

THE OUTPUT TAPE. Linear

Linear

KEEP EVALUATED DATA POINTS Linear

-------------------------- Linear

SOMETIMES IT IS CONVENIENT TO KEEP ALL ENERGY POINTS WHICH WERE Linear

PRESENT IN THE ORIGINAL EVALUATION AND TO MERELY SUPPLEMENT THESE Linear

POINTS WITH ADDITIONAL ENERGY POINTS IN ORDER TO LINEARIZE THE Linear

CROSS SECTIONS. FOR EXAMPLE, IT IS OFTEN CONVENIENT TO KEEP THE Linear

THERMAL VALUE (AT 0.0253 EV) OR THE VALUE AT 14.1 MEV. Linear

Linear

THE CURRENT VERSION OF THIS PROGRAM WILL ALLOW THE USER TO KEEP Linear

ALL ORIGINAL EVALUATED DATA POINTS BY SPECIFYING 1 IN COLUMNS Linear

34-44 OF THE FIRST INPUT LINE. THIS WILL TURN OFF THE BACKWARD Linear

THINNING (SEE UCRL-50400, VOL. 17, PART A FOR EXPLANATION) AND Linear

RESULT IN ALL ORIGINAL ENERGY POINTS BEING KEPT. CAUTION SHOULD Linear

BE EXERCISED IN USING THIS OPTION SINCE IT CAN RESULT IN A Linear

CONSIDERABLE INCREASE IN THE NUMBER OF DATA POINTS OUTPUT BY Linear

THIS CODE. Linear

Linear

FOR ALL USERS WHO ARE NOT INTERESTED IN THIS OPTIONS NO CHANGES Linear

ARE REQUIRED IN THE INPUT TO THIS PROGRAM, I. E. IF COLUMNS Linear

34-44 ARE BLANK (AS FOR ALL PREVIOUS VERSIONS OF THIS CODE) THE Linear

PROGRAM WILL OPERATE EXACTLY AS IT DID BEFORE. Linear

Linear

ALLOWABLE ERROR Linear

--------------- Linear

ALLOWABLE ERROR MUST ALWAYS BE SPECIFIED IN THE INPUT TO THIS Linear

PROGRAM AS A FRACTION, NOT A PER-CENT. FOR EXAMPLE, INPUT THE Linear

ALLOWABLE FRACTIONAL ERROR 0.001 IN ORDER TO OBTAIN DATA THAT IS Linear

ACCURATE TO WITHIN 0.1 PER-CENT. Linear

Linear

THE CONVERSION OF THE DATA FROM THE GENERAL INTERPOLATION FORM TO Linear

LINARLY INTERPOLABLE FORM CANNOT BE PERFORMED EXACTLY. HOWEVER, IT Linear

CAN BE PERFORMED TO VIRTUALLY ANY REQUIRED ACCURACY AND MOST Linear

IMPORTANTLY CAN BE PERFORMED TO A TOLERANCE THAT IS SMALL COMPARED Linear

TO THE UNCERTAINTY IN THE CROSS SECTIONS THEMSELVES. AS SUCH THE Linear

CONVERSION OF CROSS SECTIONS TO LINEARLY INTERPOLABLE FORM CAN BE Linear

PERFORMED WITH ESSENTIALLY NO LOSE OF INFORMATION. Linear

Linear

THE ALLOWABLE ERROR MAY BE ENERGY INDEPENDENT (CONSTANT) OR ENERGY Linear

DEPENDENT. THE ALLOWABLE ERROR IS DESCRIBED BY A TABULATED Linear

FUNCTION OF UP TO 20 (ENERGY,ERROR) PAIRS AND LINEAR INTERPOLATION Linear

BETWEEN TABULATED POINTS. IF ONLY ONE TABULATED POINT IS GIVEN THE Linear

ERROR WILL BE CONSIDERED CONSTANT OVER THE ENTIRE ENERGY RANGE. Linear

WITH THIS ENERGY DEPENDENT ERROR ONE MAY OPTIMIZE THE OUTPUT FOR Linear

ANY GIVEN APPLICATION BY USING A SMALL ERROR IN THE ENERGY RANGE Linear

OF INTEREST AND A LESS STRINGENT ERROR IN OTHER ENERGY RANGES. Linear

Linear

DEFAULT ALLOWABLE ERROR Linear

----------------------- Linear

IN ORDER TO INSURE CONVERGENCE OF THE LINEARIZING ALGORITHM THE Linear

ALLOWABLE ERROR MUST BE POSITIVE. IF THE USER INPUTS AN ERROR Linear

THAT IS NOT POSITIVE IT WILL AUTOMATICALLY BE SET TO THE DEFAULT Linear

VALUE (CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT) AND Linear

INDICATED AS SUCH IN THE OUTPUT LISTING. Linear

Linear

COULOMB PENETRABILITY (INTERPOLATION LAW = 6) Linear

-------------------------------------------- Linear

INTRODUCED FOR ENDF/B-VI. THIS IS DEFINED AS, Linear

Linear

SIG(E) = C1\*EXP(-C2/SQRT(E - T)) Linear

Linear

THIS PROGRAM ONLY CONSIDERS EXOTHERMIC REACTIONS - T = 0 Linear

Linear

SIG(E) = C1\*EXP(-C2/SQRT(E)) Linear

Linear

WARNING...THIS INTERPOLATION LAW SHOULD ONLY BE USED FOR REACTIONS Linear

WHICH HAVE A POSITIVE Q-VALUE (EXOTHERMIC REACTIONS), Linear

SINCE HERE WE ONLY CONSIDER T = 0.0 IN THE FORMALISM. Linear

IN ALL OTHER CASES A WARNING MESSAGE WILL BE PRINTED. Linear

Linear

INPUT FILES Linear

----------- Linear

UNIT DESCRIPTION Linear

---- ----------- Linear

2 INPUT LINES (BCD - 80 CHARACTERS/RECORD) Linear

10 ORIGINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) Linear

Linear

OUTPUT FILES Linear

------------ Linear

UNIT DESCRIPTION Linear

---- ----------- Linear

3 OUTPUT REPORT (BCD - 120 CHARACTERS/RECORD) Linear

11 FINAL ENDF/B DATA (BCD - 80 CHARACTERS/RECORD) Linear

Linear

SCRATCH FILES Linear

------------- Linear

UNIT DESCRIPTION Linear

---- ----------- Linear

12 SCRATCH FILE (BINARY - 180000 WORDS/RECORD Linear

Linear

OPTIONAL STANDARD FILE NAMES (SEE SUBROUTINE FILEIO) Linear

---------------------------------------------------- Linear

UNIT FILE NAME Linear

---- ---------- Linear

2 LINEAR.INP Linear

3 LINEAR.LST Linear

10 ENDFB.IN Linear

11 ENDFB.OUT Linear

12 (SCRATCH) Linear

Linear

Linear

INPUT PARAMETERS Linear

---------------- Linear

FOR VERSIONS EARLIER THAN 90-1 THIS PROGRAM ONLY ALLOWED THE USER Linear

TO SPECIFY BY INPUT PARAMETERS WHICH MATERIALS (MAT) TO PROCESS. Linear

FOR EACH REQUESTED MATERIAL NEUTRON INTERACTION CROSS SECTIONS Linear

(MF=3) WOULD BE LINEARIZED AND THE REMAINDER OF THE MATERIAL Linear

WOULD BE COPIED. Linear

Linear

FOR VERSIONS 90-1 AND LATER THIS PROGRAM WILL ALLOW THE USER TO Linear

TO SPECIFY BY INPUT PARAMETERS EXACTLY WHAT SECTIONS OF DATA Linear

TO PROCESS. FOR EACH SECTION OF DATA, SPECIFIED BY MAT, MF, MT Linear

RANGES, SECTIONS OF MF=3, 23 AND 27 WILL BE LINEARIZED AND ALL Linear

OTHER REQUESTED SECTIONS WILL BE COPIED. ALL SECTIONS WHICH ARE Linear

NOT EXPLICITLY REQUESTED WILL BE SKIPPED AND WILL NOT APPEAR ON Linear

ENDF/B FILE OUTPUT BY THIS PROGRAM. Linear

Linear

WITH THIS NEW PROCEDURE YOU CAN MINIMIZE THE SIZE OF THE ENDF/B Linear

FILE OUTPUT BY THIS PROGRAM, E.G., IF YOU ONLY WANT NEUTRON Linear

CROSS SECTIONS FOR SUBSEQUENT PROCESSING YOU NEED ONLY REQUEST Linear

ONLY MF=3 DATA. Linear

Linear

HOWEVER, YOU MUST UNDERSTAND THAT ONLY THOSE SECTIONS WHICH YOU Linear

EXPLICITLY REQUEST WILL APPEAR ON THE ENDF/B FILE OUTPUT BY Linear

THIS PROGRAM. FOR EXAMPLE, IF YOU WISH TO DOCUMENT EXACTLY Linear

HOW YOU LINEARIZED THE DATA BY INCLUDING COMMENTS IN MF=1, MT=451 Linear

THEN YOU MUST EXPLICITLY REQUEST THAT MF=1, MT=451 BE PROCESSED Linear

FOR EACH MATERIAL THAT YOU REQUEST. SIMILAR IF YOU WANT THE Linear

ENTIRE EVALUATION YOU MUST REQUEST ALL MF AND MT TO BE OUTPUT. Linear

Linear

LINE COLS. DESCRIPTION Linear

---- ----- ----------- Linear

1 1-11 SELECTION CRITERIA (0=MAT, 1=ZA) Linear

12-22 MONITOR MODE SELECTOR Linear

= 0 - NORMAL OPERATION Linear

= 1 - MONITOR PROGRESS OF LINEARIZING OF THE DATA. Linear

EACH TIME A PAGE OF DATA POINTS IS WRITTEN TO Linear

THE SCRATCH FILE PRINT OUT THE TOTAL NUMBER OF Linear

POINTS ON SCRATCH AND THE LOWER AND UPPER Linear

ENERGY LIMITS OF THE PAGE (THIS OPTION MAY BE Linear

USED IN ORDER TO MONITOR THE EXECUTION SPEED Linear

OF LONG RUNNING JOBS). Linear

23-33 MINIMUM CROSS SECTION OF INTEREST (BARNS). Linear

(IF 0.0 OR LESS IS INPUT THE PROGRAM WILL Linear

USE 1.0E-10). ENERGY INTERVALS WILL NOT BE Linear

SUB-DIVIDED IF THE ABSOLUTE VALUE OF THE CROSS Linear

SECTION WITHIN THE INTERVAL IS LESS THAN THIS VALUE. Linear

AN EXCEPTION TO THIS RULE IS NEAR THRESHOLDS ENERGY Linear

INTERVALS WILL BE SUB-DIVIDED UNTIL CONVERGENCE Linear

REGARDLESS OF THE MAGNITUDE OF THE CROSS SECTION. Linear

34-44 KEEP ORIGINAL EVALUATED DATA POINTS. Linear

= 0 - NO. Linear

= 1 - YES - ADDITIONAL POINTS MAY BE ADDED IN ORDER Linear

TO LINEARIZE DATA, BUT ALL ORIGINAL Linear

DATA POINTS WILL BE INCLUDED IN THE Linear

RESULTS. Linear

2 1-72 ENDF/B INPUT DATA FILENAME Linear

(STANDARD OPTION = ENDFB.IN) Linear

3 1-72 ENDF/B OUTPUT DATA FILENAME Linear

(STANDARD OPTION = ENDFB.OUT) Linear

4-N 1- 6 LOWER MAT OR ZA LIMIT Linear

7- 8 LOWER MF LIMIT Linear

9-11 LOWER MT LIMIT Linear

12-17 UPPER MAT OR ZA LIMIT Linear

18-19 UPPER MF LIMIT Linear

20-22 UPPER MT LIMIT Linear

UP TO 100 RANGES MAY BE SPECIFIED, ONLY ONE RANGE Linear

PER LINE. THE LIST OF RANGES IS TERMINATED BY A Linear

BLANK LINE. IF THE UPPER MAT LIMIT OF ANY REQUEST Linear

IS LESS THAN THE LOW LIMIT IT WILL BE SET EQUAL TO Linear

THE LOWER LIMIT. IF THE UPPER LIMIT IS STILL ZERO Linear

IT WILL BE SET EQUAL TO 999999. IF THE UPPER MF OR Linear

MT LIMIT IS ZERO IT WILL BE SET TO 99 OR 999 Linear

RESPECTIVELY. Linear

VARY 1-11 ENERGY FOR ERROR LAW Linear

12-22 ALLOWABLE FRACTIONAL ERROR FOR ERROR LAW. Linear

THE ACCEPTABLE LINEARIZING ERROR MAY BE SPECIFIED TO Linear

BE EITHER ENERGY INDEPENDENT (DEFINED BY A SINGLE Linear

ERROR), OR ENERGY DEPENDENT (DEFINED BY UP TO 20 Linear

ENERGY, ERROR PAIRS). FOR THE ENERGY DEPENDENT CASE Linear

LINEAR INTERPOLATION WILL BE USED TO DEFINE THE ERROR Linear

AT ENERGIES BETWEEN THOSE AT WHICH IT IS TABULATED. Linear

IN ALL CASES THE ERROR LAW IS TERMINATED BY A BLANK Linear

LINE. IF ONLY ONE ENERGY, ERROR PAIR IS GIVEN THE Linear

THE LAW WILL BE CONSIDERED TO BE ENERGY INDEPENDENT. Linear

IF MORE THAN ONE PAIR IS GIVEN IT WILL BE CONSIDERED Linear

TO BE ENERGY DEPENDENT (NOTE, ENERGY INDEPENDENT Linear

FORM WILL RUN FASTER THAN THE EQUIVALENT ENERGY Linear

DEPENDENT FORM). FOR AN ENERGY DEPENDENT ERROR LAW Linear

ALL ENERGIES MUST BE ASCENDING ENERGY ORDER. FOR Linear

CONVERGENCE OF THE LINEARIZING ALGORITHM ALL ERRORS Linear

MUST BE POSITIVE. IF AN ALLOWABLE ERROR IS NOT Linear

POSITIVE IT WILL BE SET EQUAL TO THE STANDARD OPTION Linear

(CURRENTLY 0.001, CORRESPONDING TO 0.1 PER-CENT). Linear

IF THE FIRST ERROR LINE IS BLANK IT WILL TERMINATE Linear

THE ERROR LAW AND THE ERROR WILL BE TREATED AS Linear

ENERGY INDEPENDENT, EQUAL TO THE STANDARD OPTION Linear

(CURRENTLY 0.1 PER-CENT). (SEE EXAMPLE INPUT 4). Linear

Linear

EXAMPLE INPUT NO. 1 Linear

------------------- Linear

RETRIEVE DATA BY ZA IN ORDER TO FIND ALL URANIUM ISOTOPES AND Linear

THORIUM 232. RETRIEVE ALL NEUTRON INTERACTION CROSS SECTIONS Linear

(MF=3). ALL ENERGY INTERVALS IN WHICH THE CROSS SECTION IS Linear

AT LEAST 1 MICRO-BARN (1.0E-06 BARNS) WILL BE SUBDIVIDED. Linear

BACKWARD THINNING WILL BE PERFORMED. FROM 0 TO 100 EV LINEARIZE Linear

TO WITHIN 0.1 PER-CENT ACCURACY. FROM 100 EV TO 1 KEV VARY Linear

ACCURACY BETWEEN 0.1 AND 1.0 PER-CENT. ABOVE 1 KEV USE 1 Linear

PER-CENT ACCURACY. Linear

Linear

EXPLICITLY SPECIFY THE STANDARD FILENAMES. Linear

Linear

IN THIS CASE THE FOLLOWING 11 INPUT LINES ARE REQUIRED Linear

Linear

1 0 1.00000- 6 0 Linear

ENDFB.IN Linear

ENDFB.OUT Linear

92000 3 0 92999 3999 Linear

90232 3 0 0 3 0 (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999) Linear

(END OF REQUEST LIST) Linear

0.00000+ 0 1.00000-03 Linear

1.00000+ 2 1.00000-03 Linear

1.00000+ 3 1.00000-02 Linear

1.00000+ 9 1.00000-02 Linear

(END OF ERROR LAW) Linear

Linear

EXAMPLE INPUT NO. 2 Linear

------------------- Linear

SAME AS THE ABOVE CASE, EXCEPT LINEARIZE ALL DATA TO WITHIN THE Linear

STANDARD ACCURACY (CURRENTLY 0.1 PER-CENT). IN ORDER TO USE THE Linear

STANDARD ACCURACY YOU NEED NOT SPECIFY ANY ERROR LAW AT ALL. IN Linear

THIS CASE INCLUDE THE HOLLERITH SECTION, MF=1, MT=451, FOR EACH Linear

MATERIAL. Linear

Linear

LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL Linear

THEN USE STANDARD FILENAMES. Linear

Linear

IN THIS CASE THE FOLLOWING 9 INPUT LINES ARE REQUIRED Linear

Linear

1 0 1.00000- 6 0 Linear

(USE DEFAULT FILENAME = ENDFB.IN) Linear

(USE DEFAULT FILENAME = ENDFB.OUT) Linear

92000 1451 92999 1451 Linear

92000 3 0 92999 3999 Linear

90232 1451 0 1451 Linear

90232 3 0 0 3 0 (UPPER LIMIT AUTOMATICALLY SET TO 90232 3999) Linear

(END OF REQUEST LIST) Linear

(0.1 PER-CENT ERROR, END OF ERROR LAW) Linear

Linear

EXAMPLE INPUT NO. 3 Linear

------------------- Linear

LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO WITHIN AN ACCURACY Linear

OF 0.5 PER-CENT (0.005 AS A FRACTION). IN THIS CASE YOU NEED NOT Linear

SPECIFY THE MAT, MF, MT RANGES. Linear

Linear

READ THE ENDF/B DATA FROM \ENDFB6\ZA092238 AND WRITE THE ENDF/B Linear

DATA TO \ENDFB6\LINEAR\ZA092238. Linear

Linear

IN THIS CASE THE FOLLOWING 6 INPUT LINES ARE REQUIRED Linear

Linear

(MAT, 1.0E-10 BARNS, THIN) Linear

\ENDFB6\ZA092238 Linear

\ENDFB6\LINEAR\ZA092238 Linear

(RETRIEVE ALL DATA, END REQUEST LIST) Linear

5.00000-03 Linear

(END OF ERROR LAW) Linear

Linear

NOTE THAT IN THIS CASE IF THE INPUT HAD SPECIFIED AN EQUIVALENT Linear

ENERGY DEPENDENT ERROR LAW BY GIVING A NUMBER OF ENERGY POINTS Linear

AT EACH OF WHICH THE ERROR IS 0.5 PER-CENT THE PROGRAM WOULD TAKE Linear

LONGER TO RUN (I.E., ONLY USE AN ENERGY DEPENDENT ERROR LAW WHEN Linear

IT IS NECESSARY). Linear

Linear

EXAMPLE INPUT NO. 4 Linear

------------------- Linear

IN ORDER TO LINEARIZE ALL MATERIALS ON AN ENDF/B TAPE TO THE Linear

STANDARD OPTION OF 0.1 PER-CENT IT IS ADEQUATE TO INPUT A SET Linear

OF COMPLETELY BLANK LINES WHICH WILL AUTOMATICALLY INVOKE ALL Linear

OF THE STANDARD OPTIONS. Linear

Linear

LEAVE THE DEFINITION OF THE FILENAMES BLANK - THE PROGRAM WILL Linear

THEN USE STANDARD FILENAMES. Linear

Linear

IN THIS CASE THE FOLLOWING THREE INPUT LINES ARE REQUIRED Linear

Linear

(MAT, 1.0E-10 BARNS, THIN) Linear

(USE DEFAULT FILENAME = ENDFB.IN) Linear

(USE DEFAULT FILENAME = ENDFB.OUT) Linear

(RETRIEVE ALL DATA, END REQUEST LIST) Linear

(0.1 PER-CENT ERROR, END OF ERROR LAW) Linear

Linear

======================================================================= Linear