

ADAS Subroutine c2spln

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C
      SUBROUTINE C2SPLN( NEDIM ,
&                      IEA    , IEVAL  ,
&                      TEEA   , EEVA   ,
&                      SCX    , SCXA   ,
&                      LERNG
&                      )
C-----
C
C ***** FORTRAN77 SUBROUTINE: C2SPLN *****
C
C PURPOSE:
C     PERFORMS CUBIC SPLINE ON LOG(ENERGY <EV/AMU> ) VERSUS
C     LOG(CX CROSS-SECTION <CM2>).
C     INPUT DATA FOR A GIVEN DONOR/RECEIVER COMBINATION DATA-BLOCK.
C
C     USING ONE-WAY SPLINES IT CALCULATES THE CROSS-SECTIONS
C     FOR 'IEVAL' COLLISION ENERGIES VALUES FROM
C     THE LIST OF COLLISION ENERGIES READ IN FROM THE INPUT FILE
C
C     IF A VALUE CANNOT BE INTERPOLATED USING SPLINES IT IS
C     EXTRAPOLATED VIA 'XXSPLE'. (SEE NOTES BELOW).
C
C CALLING PROGRAM: ADAS302/SSIA
C
C SUBROUTINE:
C
C INPUT : (I*4)  IEA      = INPUT DATA FILE: NUMBER OF COLLISION ENER-
C                   GIES READ FOR THE DATA-BLOCK BEING ASSESSED
C INPUT : (I*4)  IEVAL    = NUMBER OF ISPF ENTERED COLLISION ENERGIES
C                   VALUES FOR WHICH CX CROSS-SECTIONS
C                   ARE REQUIRED FOR TABULAR/GRAPHICAL OUTPUT.
C
C INPUT : (R*8)  TEEA()   = INPUT DATA FILE: COLLISION ENERGIES (EV/AMU)
C                   FOR THE DATA-BLOCK BEING ASSESSED.
C                   DIMENSION: COLLISION ENERGY INDEX
C INPUT : (R*8)  EEVA()   = USER ENTERED: COLLISION ENERGIES (EV/AMU)
C                   DIMENSION: COLLISION ENERGY INDEX
C
C INPUT : (R*8)  SCX()    =INPUT DATA FILE: FULL SET OF CX CROSS-
C                   SECTIONS FOR THE DATA-BLOCK BEING ANALYSED
C                   1ST DIMENSION: COLLISION ENERGY INDEX
C OUTPUT: (R*8)  SCXA()   = SPLINE INTERPOLATED OR EXTRAPOLATED
C                   CX CROSS-SECTIONS FOR
C                   THE USER ENTERED COLLISION ENERGIES.
C                   DIMENSION: COLLISION ENERGIES INDEX
C
C OUTPUT: (L*4)  LERNG() = .TRUE.  => OUTPUT 'SCXA()' VALUE WAS INTER-
C                   POLATED FOR THE USER ENTERED
C                   COLLISION ENERGY 'EEVA()'.
C                   .FALSE. => OUTPUT 'SCXA()' VALUE WAS EXTRA-
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C          POLATED FOR THE USER ENTERED
C          COLLISION ENERGY 'EEVA()'.
C          DIMENSION: COLLISION ENERGY INDEX
C
C          (I*4)  NIN      = PARAMETER = MAX. NO. OF INPUT ENERGY
C                   VALUES. MUST BE >= 'IEA'
C          (I*4)  NOUT     = PARAMETER = MAX. NO. OF OUTPUT ENERGY
C                   VALUES. MUST BE >= 'IEVAL'
C          (I*4)  L1       = PARAMETER = 1
C
C          (I*4)  IET      = ARRAY SUBSCRIPT USED INPUT FILE COLLISION
C                   ENERGIES.
C          (I*4)  IT       = ARRAY SUBSCRIPT USED FOR USER ENTERED
C                   COLLISION ENERGIES.
C          (I*4)  IOPT     = DEFINES THE BOUNDARY DERIVATIVES FOR THE
C                   SPLINE ROUTINE 'XXSPLE', SEE 'XXSPLE'.
C                   (VALID VALUES = <0, 0, 1, 2, 3, 4)
C
C          (L*4)  LSETX    = .TRUE. => SET UP SPLINE PARAMETERS RELATING
C                   TO 'XIN' AXIS.
C                   .FALSE. => DO NOT SET UP SPLINE PARAMETERS
C                   RELATING TO 'XIN' AXIS.
C                   (I.E. THEY WERE SET IN A PREVIOUS
C                   CALL )
C                   (VALUE SET TO .FALSE. BY 'XXSPLE')
C
C          (R*8)  R8FUN1   = FUNCTION - (SEE ROUTINES SECTION BELOW)
C
C          (R*8)  XIN()    = LOG( DATA FILE COLLISION ENERGIES )
C          (R*8)  YIN()    = LOG( DATA FILE CX CROSS-SECTIONS)
C          (R*8)  XOUT()   = LOG( USER ENTERED COLLISION ENERGIES.)
C          (R*8)  YOUT()   = LOG( OUTPUT GENERATED CX CROSS-SECTIONS)
C          (R*8)  DF()     = SPLINE INTERPOLATED DERIVATIVES

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C NOTE:

C ONE-DIMENSIONAL SPLINE CARRIED OUT BY THIS SUBROUTINE:

C LOG(SCX) vs. LOG(E)

C E = COLLISION ENERGY (units: eV/AMU)
C SCX = CX CROSS-SECTION (units: cm**2)

C Extrapolation criteria:

C Low E: zero gradient extrapolation (i.e. DY(1) = 0.0)
C High E: zero curvature extrapolation (i.e. DDY(N) = 0.0)

C (These criteria are met by calling XXSPLE with IOPT=4)

C ROUTINES:

C	ROUTINE	SOURCE	BRIEF DESCRIPTION
C	-----		
C	XXSPLE	ADAS	SPLINE SUBROUTINE (EXTENDED DIAGNOSTICS)
C	R8FUN1	ADAS	REAL*8 FUNCTION: (X -> X)

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C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C - PUT UNDER S.C.C.S. CONTROL

C VERSION: 1.2 DATE: 27-10-2004

C MODIFIED: Martin O'Mullane
C - Error message reported E9SPLN and not C2SPLN.

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C

INTEGER	IEA,	IEVAL,	NEDIM
LOGICAL	LERNG (IEVAL)		
REAL*8	EEVA (IEVAL),	SCX (NEDIM),	SCXA (IEVAL)
REAL*8	TEEA (NEDIM)		