

ADAS Subroutine e1spln

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      SUBROUTINE E1SPLN( NTDIM , NDDIM ,
&                      ITA    , IDA    , ITVAL  ,
&                      TETA   , TEDA   , TEVA   , DIN    ,
&                      SXB    ,        , SXBA   ,
&                      LTRNG  , LDRNG
&                      )
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C
C ***** FORTRAN77 SUBROUTINE: E1SPLN *****
C
C PURPOSE:
C     PERFORMS CUBIC SPLINE ON LOG(TEMPERATURE AND DENSITY)
C     VERSUS LOG(IONIZATIONS PER PHOTON)
C     INPUT DATA FOR A GIVEN WAVELENGTH DATA-BLOCK.
C
C     USING TWO-WAY SPLINES IT CALCULATES THE IONIZATIONS/PHOTON
C     FOR 'ITVAL' PAIRS OF ELECTRON TEMPERATURES AND DENSITIES
C     FROM THE TWO-DIMENSIONAL TABLE OF TEMPERATURES/DENSITIES READ
C     IN FROM THE INPUT FILE. IF A VALUE CANNOT BE INTERPOLATED
C     USING SPLINES IT IS EXTRAPOLATED VIA 'XXSPLE'.
C
C CALLING PROGRAM: ADAS501/SSXB
C
C SUBROUTINE:
C
C INPUT : (I*4)  NTDIM  = MAX NUMBER OF ELECTRON TEMPERATURES ALLOWED
C INPUT : (I*4)  NDDIM  = MAX NUMBER OF ELECTRON DENSITIES    ALLOWED
C
C INPUT : (I*4)  ITA    = INPUT DATA FILE: NUMBER OF ELECTRON TEMPERA-
C                       TURES READ FOR THE DATA-BLOCK BEING ASSESSED
C INPUT : (I*4)  IDA    = INPUT DATA FILE: NUMBER OF ELECTRON DENSIT-
C                       IES    READ FOR THE DATA-BLOCK BEING ASSESSED
C INPUT : (I*4)  ITVAL  = NUMBER OF ISPF ENTERED TEMPERATURE/DENSITY
C                       PAIRS  FOR WHICH IOINIZATIONS PER PHOTON
C                       ARE REQUIRED FOR TABULAR/GRAPHICAL OUTPUT.
C
C INPUT : (R*8)  TETA() = INPUT DATA FILE: ELECTRON TEMPERATURES (EV)
C                       FOR THE DATA-BLOCK BEING ASSESSED.
C                       DIMENSION: ELECTRON TEMPERATURE INDEX
C INPUT : (R*8)  TEDA() = INPUT DATA FILE: ELECTRON DENSITIES (CM-3)
C                       FOR THE DATA-BLOCK BEING ASSESSED.
C                       DIMENSION: ELECTRON DENSITY INDEX
C INPUT : (R*8)  TEVA() = USER ENTERED: ELECTRON TEMPERATURES (EV)
C                       DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C INPUT : (R*8)  DIN()  = USER ENTERED: ELECTRON DENSITIES (CM-3)
C                       DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C
C
C INPUT : (R*8)  SXB(,) =INPUT DATA FILE: FULL SET OF IONIZATIONS PER
C                       PHOTON VALUES FOR THE DATA-BLOCK BEING
C                       ANALYSED.
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C          1ST DIMENSION: ELECTRON TEMPERATURE INDEX
C          2ND DIMENSION: ELECTRON DENSITY      INDEX
C  OUTPUT: (R*8)  SXBA()  = SPLINE INTERPOLATED OR EXTRAPOLATED IONIZ-
C                    ATIONS/PHOTON FOR THE USER ENTERED ELECTRON
C                    TEMPERATURE/DENSITY PAIRS.
C                    DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C
C  OUTPUT: (L*4)  LTRNG() = .TRUE.  => OUTPUT 'SXBA()' VALUE WAS INTER-
C                    POLATED FOR THE USER ENTERED
C                    ELECTRON TEMPERATURE 'TEVA()'.
C                    .FALSE. => OUTPUT 'SXBA()' VALUE WAS EXTRA-
C                    POLATED FOR THE USER ENTERED
C                    ELECTRON TEMPERATURE 'TEVA()'.
C                    DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C
C  OUTPUT: (L*4)  LDRNG() = .TRUE.  => OUTPUT 'SXBA()' VALUE WAS INTER-
C                    POLATED FOR THE USER ENTERED
C                    ELECTRON DENSITY 'DIN()'.
C                    .FALSE. => OUTPUT 'SXBA()' VALUE WAS EXTRA-
C                    POLATED FOR THE USER ENTERED
C                    ELECTRON DENSITY 'DIN()'.
C                    DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C
C          (I*4)  NIN      = PARAMETER = MAX. NO. OF INPUT  TEMP/DENSITY
C                    VALUES. MUST BE >= 'ITA' & 'IDA'
C          (I*4)  NOUT     = PARAMETER = MAX. NO. OF OUTPUT TEMP/DENSITY
C                    PAIRS.  MUST BE >= 'ITVAL'
C          (I*4)  L1       = PARAMETER = 1
C
C          (I*4)  IED      = ARRAY SUBSCRIPT USED INPUT  FILE  ELECTRON
C                    DENSITIES.
C          (I*4)  IET      = ARRAY SUBSCRIPT USED INPUT  FILE  ELECTRON
C                    TEMPERATURES.
C          (I*4)  IT       = ARRAY  SUBSCRIPT  USED  FOR  USER  ENTERED
C                    TEMPERATURE/DENSITY PAIRS .
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()    = 1) LOG( DATA FILE ELECTRON DENSITIES      )
C                    2) LOG( DATA FILE ELECTRON TEMPERATURES )
C          (R*8)  YIN()    = LOG( DATA FILE IONIZATIONS/PHOTON )
C          (R*8)  XOUT()   = 1) LOG( SCALED USER ENTERED ELECTRON DENS. )

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C          2) LOG( SCALED USER ENTERED ELECTRON TEMPS.)
C      (R*8)  YOUT() = LOG( OUTPUT GENERATED IONIZATIONS/PHOTON )
C      (R*8)  YPASS(,) = LOG( IONIZATIONS/PHOTON) INTERMEDIATE ARRAY
C          WHICH STORES INTERPOLATED/EXTRAPOLATED
C          VALUES BETWEEN THE TWO SPLINE SECTIONS.
C          SECTIONS.
C      (R*8)  DF() = SPLINE INTERPOLATED DERIVATIVES

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C NOTE:

C ROUTINES:

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

C AUTHOR: PAUL E. BRIDEN (TESSELLA SUPPORT SERVICES PLC)
 C K1/0/37
 C JET EXT. 2520

C DATE: 30/04/91

C UNIX-IDL PORT:

C VERSION: 1.1 DATE: 02-03-95
 C MODIFIED: LALIT JALOTA (TESSELLA SUPPORT SERVICES PLC)
 C - FIRST VERSION

C VERSION: 1.2 DATE: 03-03-95
 C MODIFIED: LALIT JALOTA
 C -

C VERSION: 1.3 DATE: 15-04-96
 C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
 C - INCREASED PARAMETER NIN 20 -> 26 (CURRENT JET
 C VERSION HAS 35 BUT THIS WOULD CAUSE PROBLEMS WITH
 C IDL AT MOMENT).

C VERSION: 1.4 DATE: 22-04-96
 C MODIFIED: TIM HAMMOND
 C - INCREASED PARAMETER NIN 26 -> 35 IN LINE WITH JET.

C VERSION: 1.5 DATE: 9-10-97
 C MODIFIED: Martin O'Mullane
 C - INCREASED PARAMETER NOUT 20 -> 35.

C VERSION: 1.6 DATE: 9-09-99
 C MODIFIED: RICHARD MARTIN
 C - INCREASED NOUT 35 -> 100; NIN 30 -> 100

 C

C-----
INTEGER IDA, ITA, ITVAL, NDDIM
INTEGER NTDIM
LOGICAL LDRNG (ITVAL), LTRNG (ITVAL)
REAL*8 DIN (ITVAL), SXB (NTDIM, NDDIM)
REAL*8 SXBA (ITVAL), TEDA (IDA), TETA (ITA)
REAL*8 TEVA (ITVAL)