

ADAS Subroutine b8spln

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C
      SUBROUTINE B8SPLN( NTDIM , NDDIM ,
&                      ITA    , IDA    , ITVAL  , IDVAL  ,
&                      TETA   , TEDA   , TOUT   , DOUT   ,
&                      CINA   ,        COUTA  ,
&                      LTRNG  , LDRNG
&                      )
C-----
C
C ***** FORTRAN77 SUBROUTINE: B8SPLN ***** **
C
C PURPOSE:
C     PERFORMS CUBIC SPLINE ON LOG(TEMPERATURE AND DENSITY)
C     VERSUS LOG(COLLISIONAL-RADIATIVE MATRIX COEFFICIENTS)
C     INPUT DATA
C
C     USING TWO-WAY SPLINES IT CALCULATES THE INTERPOL. COEFFTS.
C     FOR 'ITVAL' ELECTRON TEMPERATURES AND 'IDVAL' 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: ADAS208/B8GETP
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 : NUMBER OF ELECTRON TEMPERA-
C                      TURES
C INPUT : (I*4)  IDA    = INPUT DATA : NUMBER OF ELECTRON DENSIT-
C                      IES
C INPUT : (I*4)  ITVAL  = OUTPUT DATA : NUMBER OF TEMPERATURES
C INPUT : (I*4)  IDVAL  = OUTPUT DATA : NUMBER OF DENSITIES
C
C INPUT : (R*8)  TETA() = INPUT DATA : ELECTRON TEMPERATURES (K)
C INPUT : (R*8)  TEDA() = INPUT DATA : ELECTRON DENSITIES (CM-3)
C INPUT : (R*8)  TOUT() = OUTPUT DATA : ELECTRON TEMPERATURES (K)
C INPUT : (R*8)  DOUT() = OUTPUT DATA : ELECTRON DENSITIES (CM-3)
C
C
C INPUT : (R*8)  CINA(,) =INPUT DATA FILE: FULL SET OF COLL. RAD.
C                      COEFFICIENTS FOR THE DATA-BLOCK BEING
C                      ANALYSED.
C                      1ST DIMENSION: ELECTRON TEMPERATURE INDEX
C                      2ND DIMENSION: ELECTRON DENSITY    INDEX
C OUTPUT: (R*8)  COUTA(,) = SPLINE INTERPOLATED COLL. RAD. COEFFICIENTS
C                      THE USER ENTERED TEMPERATURES AND DENSITIES
C                      1ST DIMENSION: ELECTRON TEMPERATURE INDEX
C                      2ND DIMENSION: ELECTRON DENSITY    INDEX
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C
C OUTPUT: (L*4) LTRNG() = .TRUE. => OUTPUT 'COUTA()' VALUE WAS INTER-
C POLATED FOR THE USER ENTERED
C ELECTRON TEMPERATURE 'TOUT()''.
C .FALSE. => OUTPUT 'COUTA()' VALUE WAS EXTRA-
C POLATED FOR THE USER ENTERED
C ELECTRON TEMPERATURE 'TOUT()''.
C DIMENSION: TEMPERATURE/DENSITY PAIR INDEX
C
C OUTPUT: (L*4) LDRNG() = .TRUE. => OUTPUT 'COUTA()' VALUE WAS INTER-
C POLATED FOR THE USER ENTERED
C ELECTRON DENSITY 'DOUT()''.
C .FALSE. => OUTPUT 'COUTA()' VALUE WAS EXTRA-
C POLATED FOR THE USER ENTERED
C ELECTRON DENSITY 'DOUT()''.
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) 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 TEMPERATURES.
C (I*4) IN = ARRAY SUBSCRIPT USED FOR USER ENTERED
C DENSITIES.
C (I*4) IOPT = DEFINES THE BOUNDARY DERIVATIVES FOR THE
C SPLINE ROUTOUT'E 'XXSPLE', SEE 'XXSPLE'.
C (VALID VALUES = <0, 0, 1, 2, 3, 4)
C
C (L*4) LSETX = .TRUE. => SET UP SPLINE PARAMETERS RELATOUT'G
C TO 'XIN' AXIS.
C .FALSE. => DO NOT SET UP SPLINE PARAMETERS
C RELATOUT'G 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 ROUTOUT'ES 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( INPUT COLL. RAD COEFFTS.)
C (R*8) XOUT() = 1) LOG( SCALED USER ENTERED ELECTRON DENS. )
C 2) LOG( SCALED USER ENTERED ELECTRON TEMPS.)
C (R*8) YOUT() = LOG( OUTPUT GENERATED IONIZATIONS/PHOTON )
C (R*8) YPASS(,) = LOG( COL. RAD. COEFFTS.) INTERMEDIATE ARRAY
C WHICH STORES INTERPOLATED/EXTRAPOLATED
C VALUES BETWEEN THE TWO SPLINE SECTIONS.
C SECTIONS.

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C (R*8) DF() = SPLINE INTERPOLATED DERIVATIVES

C
C

C NOTE:

C

C ROUTOUT'ES:

ROUTOUT'E	SOURCE	BRIEF DESCRIPTION
XXSPLE	ADAS	SPLINE SUBROUTOUT'E (EXTENDED DIAGNOSTICS)
R8FUN1	ADAS	REAL*8 FUNCTION: (X -> X)

C

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C K1/1/57

C JET EXT. 4941

C

C DATE: 15/07/92

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C UNIX-IDL PORT:

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C AUTHOR: DAVID H BROOKS, UNIVERSITY OF STRATHCLYDE

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C DATE: UNKNOWN

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C PUT UNDER SCCS CONTROL:

C

C VERSION: 1.1 DATE: 10/05/96

C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)

C - FIRST PUT UNDER SCCS

C

C VERSION: 1.2 DATE: 23/05/96

C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)

C - INCREASED NOUT TO 35

C

C VERSION: 1.3 DATE: 30/09/96

C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)

C - INCREASED NIN TO 35

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INTEGER	IDA,	IDVAL,	ITA,	ITVAL
INTEGER	NDDIM,	NTDIM		
LOGICAL	LDRNG (IDVAL),		LTRNG (ITVAL)	
REAL*8	CINA (NTDIM, NDDIM),		COUTA (NTDIM, NDDIM)	
REAL*8	DOUT (IDVAL),	TEDA (IDA),	TETA (ITA)	
REAL*8	TOUT (ITVAL)			