

ADAS Subroutine ceevth

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      SUBROUTINE CEEVTH ( NDENR ,
&                        LSETX , LPASS ,
&                        AMDON , AMREC , CATYP , DREN ,
&                        ILTYP , IEXTYP ,
&                        NENIN , ENIN , NENOUT , ENOUT ,
&                        SGIN , RCOUT
&                        )
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C
C ***** FORTRAN77 SUBROUTINE: CEEVTH *****
C
C VERSION: 1.0
C
C PURPOSE:  OBTAINS RATE COEFFICIENTS FOR DONOR/RECEIVER CHARGE
C           EXCHANGE COLLISIONS FOR CASES OF
C           MONOENERGETIC DONOR/THERMAL RECEIVER, THERMAL
C           DONOR/MONOENERGETIC RECEIVER, THERMAL DONOR/THERMAL
C           RECEIVER (SAME TEMPERATURE) FROM CROSS-SECTION TABULATIONS.
C
C           A MONO-ENERGETIC CASE IS ALLOWED WHICH CONVERTS INPUT
C           CROSS-SECTIONS TABULATED AT A SET OF ENERGIES/AMU TO
C           OUTPUT CROSS-SECTIONS TABULATED A DIFFERENT SET OF
C           ENERGIES/AMU.
C
C CALLING PROGRAM:  ADAS314
C
C SUBROUTINE:
C
C INPUT :  (I*4)  NDENR      = MAX. NUMBER OF ENERGIES/TEMPERATURES
C                               IN INPUT/OUTPUT ENERGY/TEMPERATURE
C                               VECTORS
C INPUT :  (L*4)  LSETX      = .TRUE. => SPLINE PRESET FOR THESE KNOTS
C                               .FLSE. => SPLINE NOT SET FOR THESE KNOTS
C INPUT :  (L*4)  LPASS      = .TRUE. => DO NOT CONVERT INTO LOG10 FOR
C                               ENERGIES AND X-SECTS. FOR SPLINE
C                               .FALSE.=> CONVERT INTO LOG10 FOR
C                               ENERGIES AND X-SECTS. FOR SPLINE
C INPUT :  (R*8)  AMDON      = DONOR MASS NUMBER
C INPUT :  (R*8)  AMREC      = RECEIVER MASS NUMBER
C INPUT :  (C2)   CATYP      = 'TT' THERMAL/THERMAL (EQUAL TEMPERATURES
C                               FOR DONOR AND RECEIVER ONLY)
C                               'TR' THERMAL RECEIVER, MONOENERGETIC DONOR
C                               'TD' THERMAL DONOR, MONOENERGETIC RECEIVER
C                               'ME' SPECIAL MONOENERGETIC CASE
C INPUT :  (R*8)  DREN       = DONOR ENERGY   ( 'TR' CASE )
C                               RECEIVER ENERGY ( 'TD' CASE )
C INPUT :  (I*4)  ILTYP      = TYPE FOR LOW AND HIGH ENERGY CROSS-
C                               SECTION EXTRAPOLATION
C                               *** a redundant parameter ***
C                               *** superceeded by IEXTYP ***
C           (I*4)  IEXTYP     = 1 => SET LOWER ENERGIES TO FIRST POINT IN DATA
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C                                     = 2 => SET LOWER ENERGIES TO 0.0
C INPUT : (I*4)   NENIN                = NUMBER OF ENERGIES IN INPUT DATA SET
C INPUT : (R*8)   ENIN()                = ENERGIES (EV/AMU) IN INPUT DATA SET
C INPUT : (I*4)   NENOUT               = NUMBER OF TEMPERATURES FOR OUTPUT DATA SET
C INPUT : (R*8)   ENOUT()              = TEMPERATURES (EV) FOR OUTPUT DATA SET FOR
C                                     'TT', 'TD', 'TR' CASES.
C                                     = ENERGY/AMU FOR OUTPUT DATA SET FOR
C                                     'ME' CASE.
C INPUT : (R*8)   SGIN()               = INPUT X-SECTIONS (CM2) FROM INPUT DATA SET
C                                     1ST.DIM: ENERGY INDEX
C OUTPUT: (R*8)   RCOUT()              = RATE COEFF. (CM3 S-1) IN OUTPUT DATA SET
C                                     1ST.DIM: TEMPERATURE INDEX
C      (I*4)     I                      = GENERAL INDEX
C      (I*4)     IT                     = GENERAL INDEX
C      (I*4)     ITHETA                 = GENERAL INDEX
C      (I*4)     IOPT                  = SPLINE END POINT CURVATURE/GRADIENT OPTION
C                                     1 => DDY1 = 0, DDYN = 0
C                                     4 => DY1 = 0 , DDYN = 0
C      (I*4)     IXD                   = DONOR GAUSSIAN QUADRATURE INDEX
C      (I*4)     IXR                   = RECEIVER GAUSSIAN QUADRATURE INDEX
C      (I*4)     NGS                   = GAUSSIAN QUADRATURE DIMENSION
C      (I*4)     NTHETA                = NUMBER OF ANGLE VALUES FOR QUADRATURE
C      (I*4)     LTHETA                = NTHETA+1
C      (I*4)     L1                    = PARAMETER = 1
C      (R*8)     ETHD                   = THERMAL ENERGY OF DONOR          (JOULES)
C      (R*8)     ETHR                   = THERMAL ENERGY RECEIVER       (JOULES)
C      (R*8)     HSIMP                  = SIMPSON'S RULE STEP INTERVAL
C      (R*8)     THETA                  = ANGLE BETWEEN PARTICLE VELOCITIES (RAD)
C      (R*8)     FAC                    = GENERAL VARIABLE
C      (R*8)     FLAG                   = GENERAL VARIABLE
C      (R*8)     XMDKG                  = DONOR MASS          (KG)
C      (R*8)     XMRKG                  = RECEIVER MASS      (KG)
C      (R*8)     VD                     = DONOR SPEED          (M S-1)
C      (R*8)     VR                     = RECEIVER SPEED       (M S-1)
C      (R*8)     RATE                   = EVALUATED RATE COEFFICIENT (CM3 S-1)
C      (R*8)     PART1                  = GENERAL VARIABLE
C      (R*8)     PART2                  = GENERAL VARIABLE
C      (R*8)     PART3                  = GENERAL VARIABLE
C      (R*8)     PART12                 = GENERAL VARIABLE
C      (R*8)     PART23                 = GENERAL VARIABLE
C      (R*8)     PART123                = GENERAL VARIABLE
C      (R*8)     VREL1                  = GENERAL RELATIVE SPEED VARIABLE
C      (R*8)     XSEC1                  = GENERAL CROSS-SECTION VARIABLE
C      (R*8)     VAL                    = GENERAL VARIABLE
C      (R*8)     XGS()                  = GAUSSIAN QUADRATURE NODES
C      (R*8)     WGS()                  = GAUSSIAN QUADRATURE WEIGHTS
C      (R*8)     VREL()                 = RELATIVE SPEED OF PARTICLES FOR DIFFERENT
C                                     ANGLES (CM S-1)
C      (R*8)     XSEC()                 = CHARGE EXCHANGE CROSS-SECTIONS FOR
C                                     RELATIVE SPEEDS AT DIFFERENT ANGLES (CM2)
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C
C ROUTINES:

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C          ROUTINE      SOURCE      BRIEF DESCRIPTION
C          -----
C          CESGCX      ADAS          INTERPOLATES CX CROSS-SECTION TABLES
C
C
C  AUTHOR:   H. P. SUMMERS, UNIVERSITY OF STRATHCLYDE
C           JA8.08
C           TEL. 0141-553-4196
C  DATE:    02/11/95
C
C  UPDATE:   09/07/98  Martin O'Mullane
C           CHANGED NAME FROM CXTHER TO CDEVTH. SIMILAR FUNCTIONALITY
C           BUT IS EXTENDED TO DEAL WITH EXTRA AVERAGING METHODS.
C
C  VERSION:  1.1  DATE: 01-12-98
C  MODIFIED: RICHARD MARTIN
C - PUT UNDER SCCS CONTROL
C
C  VERSION:  1.2  DATE: 24-03-99
C  MODIFIED: MARTIN O'MULLANE
C - SECOND VERSIONS
C
C  VERSION:           1.3                                DATE: 17-05-07
C  MODIFIED: Allan Whiteford
C           - Updated comments as part of subroutine documentation
C           procedure.
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CHARACTER*2	CATYP			
INTEGER	IEXTYP,	ILTYP,	NDENR,	NENIN
INTEGER	NENOUT			
LOGICAL	LPASS,	LSETX		
REAL*8	AMDON,	AMREC,	DREN	
REAL*8	ENIN (NDENR),	ENOUT (NDENR)		
REAL*8	RCOUT (NDENR),		SGIN (NDENR)	