

## ADAS Subroutine exther

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C
      SUBROUTINE EXTHER ( NEDIM , NTDIM ,
&                        LSETX , LPASS ,
&                        AMDON , AMREC , ILTYP ,
&                        NENIN , ENIN , NENOUT , ENOUT ,
&                        SGIN , RCOUT
&                        )
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C
C
C ***** FORTRAN77 SUBROUTINE: EXTHER *****
C
C VERSION: 1.0 (ADAS91)
C
C PURPOSE:  OBTAINS RATE COEFFICIENTS FOR DONOR/RECEIVER CHARGE
C           EXCHANGE COLLISIONS FOR CASES OF THERMAL DONOR AND
C           THERMAL RECEIVER FROM CROSS-SECTION TABULATIONS. AN ARRAY
C           OF VALUES IS PRODUCED.
C
C CALLING PROGRAM:  ADAS509
C
C SUBROUTINE:
C
C INPUT :  (I*4)  NEDIM      = MAX. NUMBER OF ENERGIES IN SOURCE DATA
C                               VECTOR
C INPUT :  (I*4)  NTDIM      = MAX. NUMBER OF TEMPERATURES IN OUTPUT
C                               VECTOR
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                               .FLSE. => 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 :  (I*4)  ILTYP      = TYPE FOR LOW AND HIGH ENERGY CROSS-
C                               SECTION EXTRAPOLATION
C
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
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: DONOR TEMPERATURE INDEX
C                               2ND.DIM: RECEIVER TEMPERATURE INDEX
C
C           (I*4)  I          = GENERAL INDEX
C           (I*4)  IT         = GENERAL INDEX
C           (I*4)  ITR        = GENERAL INDEX
C           (I*4)  ITD        = GENERAL INDEX
C           (I*4)  ITHETA     = GENERAL INDEX
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C      (I*4)   IOPT      = SPLINE END POINT CURVATURE/GRADIENT OPTION
C
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
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
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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ROUTINES:

ROUTINE	SOURCE	BRIEF DESCRIPTION
SIGCX	ADAS	INTERPOLATES CX CROSS-SECTION TABLES

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DATE: 17/11/95

UNIX-IDL PORT: H.P.SUMMERS

C VERSION: 1.1 DATE: 30-04-96  
C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)  
C - PUT UNDER SCCS CONTROL

C  
C VERSION : 1.2  
C DATE : 15-12-2006  
C MODIFIED: Martin O'Mullane  
C - Trap vrel=0 before passing to sigcx.

C-----  
INTEGER                  ILTYP,          NEDIM,          NENIN,          NENOUT  
INTEGER                  NTDIM  
LOGICAL                  LPASS,          LSETX  
REAL\*8                  AMDON,          AMREC,          ENIN (NEDIM)  
REAL\*8                  ENOUT (NTDIM) ,          RCOUT (NTDIM, NTDIM)  
REAL\*8                  SGIN (NEDIM)