

ADAS Subroutine cxther

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C
      SUBROUTINE CXTHER ( NEDIM , NTDIM ,
&                        LSETX , LPASS ,
&                        AMDON , AMREC ,
&                        ALPH , ETH , ILTYP ,
&                        NENIN , ENIN , NENOUT , ENOUT ,
&                        SGIN , RCOUT
&                        )
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C
C ***** FORTRAN77 SUBROUTINE: CXTHER *****
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:  ADAS302
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 :  (R*8)  ALPH     = HIGH ENERGY EXTENSION PARAMETER
C INPUT :  (R*8)  ETH      = THRESHOLD ENERGY (RYD.)
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
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C (I*4) ITR = GENERAL INDEX
 C (I*4) ITD = 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
 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)

ROUTINES:

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

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C
C UNIX-IDL PORT: H.P.SUMMERS
C
C VERSION: 1.1 DATE: 19-11-96
C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C - PUT UNDER S.C.C.S. CONTROL
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C-----
INTEGER ILTYP, NEDIM, NENIN, NENOUT
INTEGER NTDIM
LOGICAL LPASS, LSETX
REAL*8 ALPH, AMDON, AMREC
REAL*8 ENIN (NEDIM) , ENOUT (NTDIM) , ETH
REAL*8 RCOUT (NTDIM,NTDIM) , SGIN (NEDIM)