ADAS Subroutine d5spow

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       SUBROUTINE D5SPOW( LSELA  , LEXSA  , LDEFA  , LPART  , LEXSS  ,
     &                    IZ0    , IZL    , IZH    , NPART  ,
     &                    ISDIMD , IZDIMD , ITDIMD , IPDIMD , IMDIMD ,
     &                    ACDA   , SCDA   , CCDA   , PRBA   ,
     &                    PRCA   , QCDA   , XCDA   , PLTA   ,
     &                    NMSUM  , IZIP   , IMIP   , IPIZM  ,
     &                    NTDIM  , ITMAX  ,
     &                    DENS   , DENSH  ,
     &                    FPABUN , FSABUN ,
     &                    PLTPEQ ,
     &                    ACDSEQ , SCDSEQ , CCDSEQ , PRBSEQ ,
     &                    PRCSEQ , PLTSEQ ,
     &                    PRBEQ  , PRCEQ  , PLTEQ  , PRADA
     &                  )
C
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: D5SPOW *********************
C
C PURPOSE : TO ASSEMBLE RADIATED POWER FUNCTIONS USING FRACTIONAL
C           METASTABLE ABUNDANCES.
C           GENERATE STANDARD ISONUCLEAR MASTER DATA FROM PARTIAL DATA.
C
C NOTE    : THE SOURCE ISONUCLEAR MASTER FILE DATA ARE OBTAINED BY A
C           PRIOR CALL TO SUBROUTINE D5DATA FROM SEQUENTIAL FILES
C           WITH THE FOLLOWING NAMING CONVENTIONS:
C
C                   (1) JETSHP.ACD<YR>#<EL).<CODE>DATA
C                   (2) JETSHP.SCD<YR>#<EL>.<CODE>DATA
C                   (3) JETSHP.CCD<YR>#<EL>.<CODE>DATA
C                   (4) JETSHP.PRB<YR>#<EL>.<FILT>.<CODE>DATA
C                   (5) JETSHP.PRC<YR>#<EL>.<FILT>.<CODE>DATA
C                   (6) JETSHP.QCD<YR>#<EL>.<CODE>DATA
C                   (7) JETSHP.XCD<YR>#<EL>.<CODE>DATA
C                   (8) JETSHP.PLT<YR>#<EL>.<CODE>DATA
C
C       WHERE, <YR>   = TWO DIGIT YEAR NUMBER
C              <EL>   = ONE OR TWO CHARACTER ELEMENT SYMBOL
C              <CODE> = R       => PARTIAL DATA
C                       U       => PARTIAL DATA
C                       OMITTED => STANDARD DATA
C              <FILT> = SIX CHARACTER POWER FILTER CODE
C
C       AND DATA OF CLASSES 6 AND 7 DO NOT EXIST FOR THE PARTIAL CASE.
C
C
C INPUT  : (L*4)  LSELA()   = .TRUE.  => INPUT DATA SET TYPE FOR THIS
C                                        INDEX SELECTED
C                           = .FALSE. => INPUT DATA SET FOR THIS INDEX
C                                        NOT SELECTED
C INPUT  : (L*4)  LEXSA()   = .TRUE.  => INPUT DATA SET TYPE FOR THIS
C                                        SELECTED INDEX EXISTS
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C                              = .FALSE. => INPUT DATA SET DOES NOT EXIST
C                                           FOR THIS SELECTED INDEX
C INPUT  : (L*4)  LDEFA()    = .TRUE.  => INPUT DATA SET TYPE FOR THIS
C                                           DEFAULT YEAR INDEX EXISTS
C                              = .FALSE. => INPUT DATA SET DOES NOT EXIST
C                                           FOR THIS DEFAULT YEAR INDEX
C INPUT  : (L*4)  LPART      = .TRUE.  => PARTIAL DATA SELECTED
C                              = .FALSE. => STANDARD DATA SELECTED
C INPUT  : (I*4)  IZ0        = NUCLEAR CHARGE
C INPUT  : (I*4)  IZL        = MINIMUM ION CHARGE+1 IN MASTER DATA FILES
C INPUT  : (I*4)  IZH        = MAXIMUM ION CHARGE+1 IN MASTER DATA FILES
C INPUT  : (I*4)  NPART()    = METASTABLE PARTITION.  I.E. NUMBER OF
C                              METASTABLES FROM CHARGE STATE IZL-1 TO
C                              IZH ON INPUT
C INPUT  : (I*4)  ISDIMD     = MAXIMUM NUMBER OF (CHARGE, PARENT, GROUND)
C                              BLOCKS IN ISONUCLEAR MASTER FILES
C INPUT  : (I*4)  IZDIMD     = MAXIMUM NUMBER OF CHARGE STATES
C                              IN ISONUCLEAR MASTER FILES
C INPUT  : (I*4)  ITDIMD     = MAXIMUM NUMBER OF TEMP OR DENS VALUES IN
C                              ISOELECTRONIC MASTER FILES
C INPUT  : (I*4)  IPDIMD     = MAXIMUM NUMBER OF METASTABLES FOR EACH
C                              IONISATION STAGE
C INPUT  : (I*4)  IMDIMD     = MAXIMUM NUMBER OF METASTABLES
C
C INPUT  : (R*8)  ACDA(,,,) = INTERPOLATION OF ACD COEFFICIENT (CM3 S-1)
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: RECOMBINING METASTABLE INDEX
C                              4TH DIM: RECOMBINED METASTABLE INDEX
C INPUT  : (R*8)  SCDA(,,,) = INTERPOLATION OF SCD COEFFICIENT (CM3 S-1)
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: RECOMBINING METASTABLE INDEX
C                              4TH DIM: RECOMBINED METASTABLE INDEX
C INPUT  : (R*8)  CCDA(,,,) = INTERPOLATION OF CCD COEFFICIENT (CM3 S-1)
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: RECOMBINING METASTABLE INDEX
C                              4TH DIM: RECOMBINED METASTABLE INDEX
C INPUT  : (R*8)  PRBA(,,)  = INTERPOLATION OF PRB COEFFICIENT (W CM3 )
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: RECOMBINING METASTABLE INDEX
C INPUT  : (R*8)  PRCA(,,)  = INTERPOLATION OF PRC COEFFICIENT (W CM3 )
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: RECOMBINING METASTABLE INDEX
C INPUTT : (R*8)  QCDA(,,,) = INTERPOLATION OF QCD COEFFICIENT (CM3 S-1)
C                              1ST DIM: TEMPERATURE INDEX
C                              2ND DIM: CHARGE STATE INDEX
C                              3RD DIM: FIRST METASTABLE INDEX
C                              4TH DIM: SECOND METASTABLE INDEX
C INPUT  : (R*8)  XCDA(,,,) = INTERPOLATION OF XCD COEFFICIENT (CM3 S-1)
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C                                1ST DIM: TEMPERATURE INDEX
C                                2ND DIM: CHARGE STATE INDEX
C                                3RD DIM: FIRST PARENT METASTABLE INDEX
C                                4TH DIM: SECOND PARENT METASTABLE INDEX
C INPUT  : (R*8)  PLTA(,,)   = INTERPOLATION OF PLT COEFFICIENT (W CM3 )
C                                1ST DIM: TEMPERATURE INDEX
C                                2ND DIM: CHARGE STATE INDEX
C                                3RD DIM: METASTABLE INDEX
C INPUT  : (I*4)  NMSUM      = TOTAL NUMBER OF POPULATIONS
C
C INPUT  :        IZIP()     = ION CHARGE +1 (IZ1) OF METASTABLE IN LIST
C INPUT  :        IMIP()     = METASTABLE INDEX WITHIN CHARGE STATE IZ1
C                                OF METASTABLE INDEX FROM COMPLETE LIST
C INPUT  :        IPIZM(,)   = METASTABLE INDEX IN COMPLETE LIST
C                                1ST DIM: INDEX IZ1-IZL+1
C                                2ND DIM: METASTABLE COUNT FOR STAGE (IGRD)
C INPUT  : (I*4)  NTDIM      = MAXIMUM NUMBER OF DTEV/DDENS PAIRS
C INPUT  : (I*4)  ITMAX      = NUMBER OF ( DTEV() , DDENS() ) PAIRS
C INPUT  : (R*8)  DENS()     = ELECTRON DENSITIES (CM-3))
C INPUT  : (R*8)  DENSH()    = HYDROGEN DENSITIES (CM-3))
C INPUT  : (R*8)  FPABUN(,) = RESOLVED METASTABLE EQUILIBRIUM
C                                FRACTIONAL ABUNDANCES
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR
C                                2ND DIM: - METASTABLE INDEX
C OUTPUT : (L*4)  LEXSS()    = .TRUE.  => OUTPUT STANDARD MASTER DATA FOR
C                                         THIS INDEX GENERATED
C                              = .FALSE. => OUTPUT STANDARD MASTER DATA FOR
C                                         THIS INDEX NOT GENERATED
C OUTPUT : (R*8)  FSABUN(,) = STAGE EQUILIBRIUM FRACTIONAL ABUNDANCES
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  PLTPEQ(,) = METASTABLE PARTIAL EQUILIBRIUM RADIATED
C                                LINE POWER FUNCTIONS
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR
C                                2ND DIM: - METASTABLE INDEX
C OUTPUT : (R*8)  ACDSEQ(,) = STANDARD (UNRESOLVED) ACD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  SCDSEQ(,) = STANDARD (UNRESOLVED) SCD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  CCDSEQ(,) = STANDARD (UNRESOLVED) CCD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  PRBSEQ(,) = STANDARD (UNRESOLVED) SCD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  PRCSEQ(,) = STANDARD (UNRESOLVED) CCD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
C OUTPUT : (R*8)  PLTSEQ(,) = STANDARD (UNRESOLVED) CCD COEFFICIENT
C                                1ST DIM: - TEMPERATURE/DENSITY PAIR INDEX
C                                2ND DIM: - CHARGE STATE INDEX (IZ1-IZL+1)
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C OUTPUT : (R*8)  PRBEQ()   = TOTAL EQUILIBRIUM RADIATED RECOM-BREMS
C                             POWER FUNCTION
C OUTPUT : (R*8)  PRCEQ()   = TOTAL EQUILIBRIUM CX RADIATED RECOM POWER
C                             FUNCTION NORMALISED TO ELECTRON
C                             DENSITY
C OUTPUT : (R*8)  PLTEQ()   = TOTAL EQUILIBRIUM RADIATED LINE POWER
C                             FUNCTION
C OUTPUT : (R*8)  PRADA()   = TOTAL EQUILIBRIUM RADIATED POWER FUNCTION
C
C PROGRAM: (I*4)  IT        = GENERAL INDEX FOR TEMPERATURE
C          (I*4)  IZ        = GENERAL INDEX FOR CHARGE
C          (I*4)  IP        = GENERAL INDEX FOR CHARGE
C          (I*4)  IZ1       = GENERAL INDEX FOR CHARGE+1
C          (I*4)  ICL       = GENERAL INDEX FOR CLASS
C          (I*4)  IPP       = GENERAL PARENT INDEX
C          (I*4)  IPG       = GENERAL GROUND INDEX
C          (I*4)  IZREF     = GENERAL CHARGE STAE POINTER INDEX
C          (I*4)  IPRT      = GENERAL INDEX FOR PARENT METASTABLE
C          (I*4)  IGRD      = GENERAL INDEX FOR METASTABLE
C
C
C ROUTINES:
C          ROUTINE    SOURCE    BRIEF DESCRIPTION
C          ------------------------------------------------------------
C
C
C AUTHOR : H. P. SUMMERS, JET
C          K1/1/57
C          JET  EXT. 4941
C
C DATE   : 28/04/94
C
C UNIX-IDL PORT:
C VERSION:     1.1                          DATE: 31-10-95
C MODIFIED:    TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C              - INITIAL VERSION TO BE USED FOR UNIX PLATFORMS
C
C VERSION:     1.2                          DATE: 08-11-95
C MODIFIED:    TIM HAMMOND
C              - ALTERED LINE 'IF(LEXSA(ICL).OR.LDEFA(ICL))' IN LOOP 1
C                TO 'IF((LEXSA(ICL).OR.LDEFA(ICL)).AND.LSELA(ICL))' TO
C                REFLECT WHETHER OR NOT THE USER HAS ACTUALLY SELECTED
C                THIS PARTICULAR CLASS FOR INCLUSION.
C              - TIDIED UP COMMENTS AND CODE
C
C VERSION:     1.3                          DATE: 08-11-95
C MODIFIED:    TIM HAMMOND
C              - REMOVED SUPERFLUOUS VARIABLES
C
C-----------------------------------------------------------------------
      INTEGER             IMDIMD,      IMIP(IMDIMD),             IPDIMD
      INTEGER             IPIZM(IZDIMD,IPDIMD),     ISDIMD,      ITDIMD
      INTEGER             ITMAX,       IZ0,         IZDIMD,      IZH
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INTEGER             IZIP(IMDIMD),              IZL,          NMSUM
INTEGER             NPART(IZDIMD),             NTDIM
LOGICAL             LDEFA(8),    LEXSA(8),     LEXSS(8),     LPART
LOGICAL             LSELA(8)
REAL*8              ACDA(NTDIM,IZDIMD,IPDIMD,IPDIMD)
REAL*8              ACDSEQ(NTDIM,IZDIMD)
REAL*8              CCDA(NTDIM,IZDIMD,IPDIMD,IPDIMD)
REAL*8              CCDSEQ(NTDIM,IZDIMD),      DENS(NTDIM)
REAL*8              DENSH(NTDIM),              FPABUN(NTDIM,IMDIMD)
REAL*8              FSABUN(NTDIM,IZDIMD)
REAL*8              PLTA(NTDIM,IZDIMD,IPDIMD)
REAL*8              PLTEQ(NTDIM),              PLTPEQ(NTDIM,IMDIMD)
REAL*8              PLTSEQ(NTDIM,IZDIMD),      PRADA(NTDIM)
REAL*8              PRBA(NTDIM,IZDIMD,IPDIMD)
REAL*8              PRBEQ(NTDIM),              PRBSEQ(NTDIM,IZDIMD)
REAL*8              PRCA(NTDIM,IZDIMD,IPDIMD)
REAL*8              PRCEQ(NTDIM),              PRCSEQ(NTDIM,IZDIMD)
REAL*8              QCDA(NTDIM,IZDIMD,IPDIMD,IPDIMD)
REAL*8              SCDA(NTDIM,IZDIMD,IPDIMD,IPDIMD)
REAL*8              SCDSEQ(NTDIM,IZDIMD)
REAL*8              XCDA(NTDIM,IZDIMD,IPDIMD,IPDIMD)
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