

## ADAS Subroutine ionbal

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      SUBROUTINE IONBAL( YEAR , YEARDF, IFAIL ,  
&                      IZ0   , ITMAX ,  
&                      DTEV  , DDENS , DDENSH,  
&                      FABUND  
&                      )
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C ***** FORTRAN77 SUBROUTINE: IONBAL *****  
C  
C VERSION : 1.1  
C  
C CALLING PROGRAM: ADAS412  
C  
C PURPOSE : TO EVALUATE EQUILIBRIUM IONIS. BALANCE IN A PLASMA OF  
C           FIXED ELECTRON TEMPERATURE, ELECTRON DENSITY AND NEUTRAL  
C           HYDROGEN DENSITY.  
C  
C NOTE    : ATOMIC RATE COEFFICIENT DATA ARE EXTRACTED FROM THE  
C           MASTER ELEMENT FILES USING THE SUBROUTINE 'DHDATA'.  
C  
C INPUT   : (C*2)  YEAR      = YEAR OF DATA  
C           (C*2)  YEARDF   = DEFAULT YEAR OF DATA IF REQUESTED YEAR  
C                   DOES NOT EXIST.  
C           (I*4)  IZ0      = NUCLEAR CHARGE  
C           (I*4)  ITMAX    = NUMBER OF DTEV(), DDENS(), DDENSH() SETS  
C           (R*8)  DTEV()   = DLOG10(ELECTRON TEMPERATURES (EV))  
C           (R*8)  DDENS()  = DLOG10(ELECTRON DENSITIES (CM-3))  
C           (R*8)  DDENSH() = DLOG10(NEUTRAL. H DENSITIES (CM-3))  
C  
C OUTPUT  : (I*4)  IFAIL    = 0    IF ROUTINE SUCCESSFUL  
C                   1    IF ROUTINE UNSUCCESSFUL  
C           (R*8)  FABUND() = FRACTIONAL ABUNDANCES FOR DTEV() ETC.  
C  
C PROGRAM : (C*80) FINFO    = INFORMATION STRING  
C           (C*2)  YEARIN   = ACTIVE YEAR OF DATA WHEN CYCLING  
C                   (RESET IF NECESSARY FROM YEAR TO YEARDF)  
C           (I*4)  NTDIM    = MAXIMUM NUMBER OF TEMP, DENS PAIRS  
C           (I*4)  NTDIMD   = MAXIMUM NUMBER OF DATA TEMP & DENS  
C           (I*4)  NZDIM    = MAXIMUM NUMBER OF IONISATION STAGES  
C           (I*4)  ICLASA() = CLASSES OF DATA TO BE EXTRACTED  
C           (I*4)  NCLASS   = NUMBER OF DATA CLASSES TO BE EXTRACTED  
C           (I*4)  ICLASS   = INDEX OF PARTICULAR CLASS  
C           (I*4)  IZZ      = ION CHARGE  
C           (I*4)  IZ1      = ION CHARGE+1  
C           (I*4)  IEVCUT   = ENERGY CUTOFF (EV)  
C           (I*4)  ITMAXD   = NUMBER OF DATA DTEVD()  
C           (I*4)  IDMAXD   = NUMBER OF DATA DDENS()  
C           (I*4)  IZMAXD   = NUMBER OF DATA ZDATA()  
C           (I*4)  IT       = INDEX USED WITH TEMPS  
C           (I*4)  ICL      = INDEX USED WITH DATA CLASSES  
C           (I*4)  N        = NO. OF IONIS. STAGES INCL. BARE NUCLEUS  
C                   (EQUALS IZ0+1)  
C           (I*4)  IZM      = ION CHARGE -1
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C (R\*8) DENS() = ELECTRON DENSITIES (CM-3)  
 C (R\*8) DENSH() = NEUTRAL H DENSITIES (CM-3)  
 C (R\*8) DTEVD() = DLOG10(DATA ELECTRON TEMPS (EV))  
 C (R\*8) DDENSD() = DLOG10(DATA ELECTRON DENSITIES (CM-3))  
 C (R\*8) ZDATA() = Z1 CHARGES IN DATA SET  
 C (R\*8) DRCOFD(,,) = DLOG10(DATA RATE COEFFICIENTS (CM3/S))  
 C (R\*8) DRCOFI() = INTERPOLATION OF DRCOFD(,,) FOR  
 C DTEV() & DDENS()  
 C (R\*8) ACDA(,) = INTERPOLATED RECOM. COEFFT (CM3/S)  
 C (R\*8) SCDA(,) = INTERPOLATED IONIS. COEFFT (CM3/S)  
 C (R\*8) CCDA(,) = INTERPOLATED CXR COEFFT. (CM3/S)  
 C (R\*8) POPF() = STAGE FRACTIONAL ABUNDANCES  
 C (R\*8) EV = TEMPERATURE (K) EQUIVALENT TO 1 EV  
 C (R\*8) RH = RATIO (H DENS)/(ELEC. DENS)  
 C (R\*8) U = TEMPORARY PARAMETER  
 C (R\*8) SUM = TEMPORARY PARAMETER

C ROUTINES:

ROUTINE	SOURCE	BRIEF DESCRIPTION
DHDATA	ADAS	EXTRACT 'SANCO' DATA FROM MASTER FILES

C AUTHOR : HP SUMMERS  
 C K1/1/57  
 C JET EXT. 4941

C DATE : 25/06/91

C UPDATE : 27/04/92 HP SUMMERS - ADDED DEFAULT YEAR FOR DATA IF  
 C REQUESTED YEAR DOES NOT EXIST.  
 C (ADDED 'YEARDF') IN DHDATA

C VERSION 1.1 DATE: 28-10-97

C RICHARD MARTIN

C PUT UNDER SCCS CONTROL (ADAS412).

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CHARACTER*2	YEAR,	YEARDF	
INTEGER	IFAIL,	ITMAX,	IZO
REAL*8	DDENS(NTDIM),		DDENSH(NTDIM)
REAL*8	DTEV(NTDIM),	FABUND(NTDIM,	NZDIM)