kmod

Interpolates linearly a Kurucz model for the desired values of effective temperature, surface gravity and metallicity using 8 surrouding models from his theoretical grid. These grids are all in a standard format defined by Kurucz and can be downloaded from his website `http:kurucz.harvard.edu`. The code was written for models with effective temperatures under 10,000 K. Models are read by another subroutine, rd_kmod.pro, and the correct path for the input model files needs to be specified there. (using the *kpath* variable).

Syntax

KMOD,teff,logg,metal,model,header,tail[,type=type]

Return Value

KMOD produces a plain-text file with a single Kurucz model atmosphere.

Arguments

teff - (float) Effective temperature (K)

logg - (float) log10 of the surface gravity (g in cm/s/s)

metal - (float) [M/H] overall metallicity relative to solar

model - (string) Name for the output model atmosphere file

Keywords

- ntau - (integer) On output returns the number of depths in the model
- type - (string) This is an input; it can take one of three values: old, odfnew, or alpha, which leads to the use of models in files that start by a 4-character metallicity identifier (e.g. ap05 or am45 for models with metallicities [Fe/H]= $+0.5$ or -4.5, respectively, followed by 'k2.dat' (type='old'), 'ak2odfnew.dat' (type='odfnew'), or 'ak2odfnew.dat' (type='alpha', for alpha-enhanced, odfnew models).

Discussion

This code interpolates all quantities in the model to the same logtau scale, and then interpolates linearly, using the nearest 8 models defined in the grid (not necessarily those available, but those in the equidistant grid defined internally), each quantity (T, Pg, etc.) at each depth.

The code has been used in a number of studies, e.g. in the Reddy et al. (2003,2006) papers published on MNRAS. Only recently we have performed a study in depth of the errors involved, and compared those with errors the result from interpolated in grids of high-resolution continuum-normalized fluxes with the same density (see paper by Mészáros to appear in late 2012). Interestingly, it is much better to interpolate fluxes than structures.

References

Kurucz, R. L. 1979, ApJS, 40, 1

Kurucz, R. L. 1970, SAO Special Report, 309,

Castelli, F., & Kurucz, R. L. 2004, arXiv:astro-ph/0405087

Mészáros, Sz., Allende Prieto, C. 2012, in preparation (on the linear interpolation of model atmospheres and fluxes)

Example

To produce a model for Teff=5777 K, logg=4.437 and solar metallicity model from the odfnew grid with a 2 km/s microturbulence (model which should be in the file p00k2odfnew.dat', and which the user needs to make accessible to the code editing 'kpath' in the source code):

IDL> kmod,5777.,4.437,0.0,'sol.mod'

Version History

C. Allende Prieto, UT, initial version coded in 1999

Bug fixed in 2005

adapted to included newer (odfnew) models in 2006