

StePar: an automatic code for stellar parameter determination

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Abstract

We introduce a new automatic code (StePar) for determining stellar atmospheric parameters (T_{eff} , $\log g$, ξ and $[\text{Fe}/\text{H}]$) in an automated way. StePar employs the 2002 version of the MOOG code (Sneden 1973) and a grid of Kurucz ATLAS9 plane-parallel model atmospheres (Kurucz 1993). The atmospheric parameters are obtained from the EWs of 263 Fe I and 36 Fe II lines (obtained from Sousa et al. 2008, A&A, 487, 373) iterating until the excitation and ionization equilibrium are fulfilled. StePar uses a Downhill Simplex method that minimizes a quadratic form composed by the excitation and ionization equilibrium conditions. Atmospheric parameters determined by StePar are independent of the stellar parameters initial-guess for the problem star, therefore we employ the canonical solar values as initial input. StePar can only deal with FGK stars from F6 to K4, also it can not work with fast rotators, veiled spectra, very metal poor stars or Signal to noise ratio below 30. Optionally StePar can operate with MARCS models (Gustafson et al. 2008, A&A, 486, 951) instead of Kurucz ATLAS9 models, additionally Turbospectrum (Alvarez & Plez 1998, A&A, 330, 1109) can replace the MOOG code and play its role during the parameter determination. StePar has been used to determine stellar parameters for some studies (Tabernero et al. 2012, A&A, 547, A13; Wisniewski et al. 2012, AJ, 143, 107). In addition StePar is being used to obtain parameters for FGK stars from the GAIA-ESO Survey.

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