

THE LOW DISPERSION SYNTHETIC SPECTRA OF COOL GIANT STARS

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ABSTRACT. The mean energy distribution of cool giant stars was used for comparison with synthetic spectra. The synthetic spectra was calculated using the various grids of stellar model atmospheres.

Key words: Cool giant stars, spectrophotometry, synthetic spectra, parameters

In recent years a large effort has been made to compute parameters of the bound-bound transitions for atoms, ions and molecules. The little attention has been given to the free-free and bound-free transitions of diatomic molecules and their ions, which can have a significant contribution in continuous opacity. Moreover the unknown sources of opacity in atmospheres of cool giant stars have been supposed because the discrepancies between synthetic and observed spectra in region wavelength with $\lambda < 450\text{nm}$ have been found (Komarov & Dulapchi, 1993, Dragunova & Belik, 1996).

To study this effect the synthetic spectra were calculated with interval 0.01 nm and with parameters - T_{eff} (effective temperature) from 4000 to 6000K, $\log g$ (gravity) for 2.0, 2.5 and 3.0, $[\text{Fe}/\text{H}]$ (metallicity - abundance of elements of group Fe in the atmosphere of star with respect to solar one) for 0.0, -0.5 and -1.0. The models were calculated for interpolated fundamental parameters (Tsymbal, 1996) and than the synthetic spectrum were averaged for interval 5 nm. The synthetic spectra of giant stars of later spectral types were not calculated because this calculation needs to take into account the molecular opacity. The new list of lines was used in the wavelength range of $\lambda \lambda 320\text{-}900\text{ nm}$ (Kurucz, 1993b).

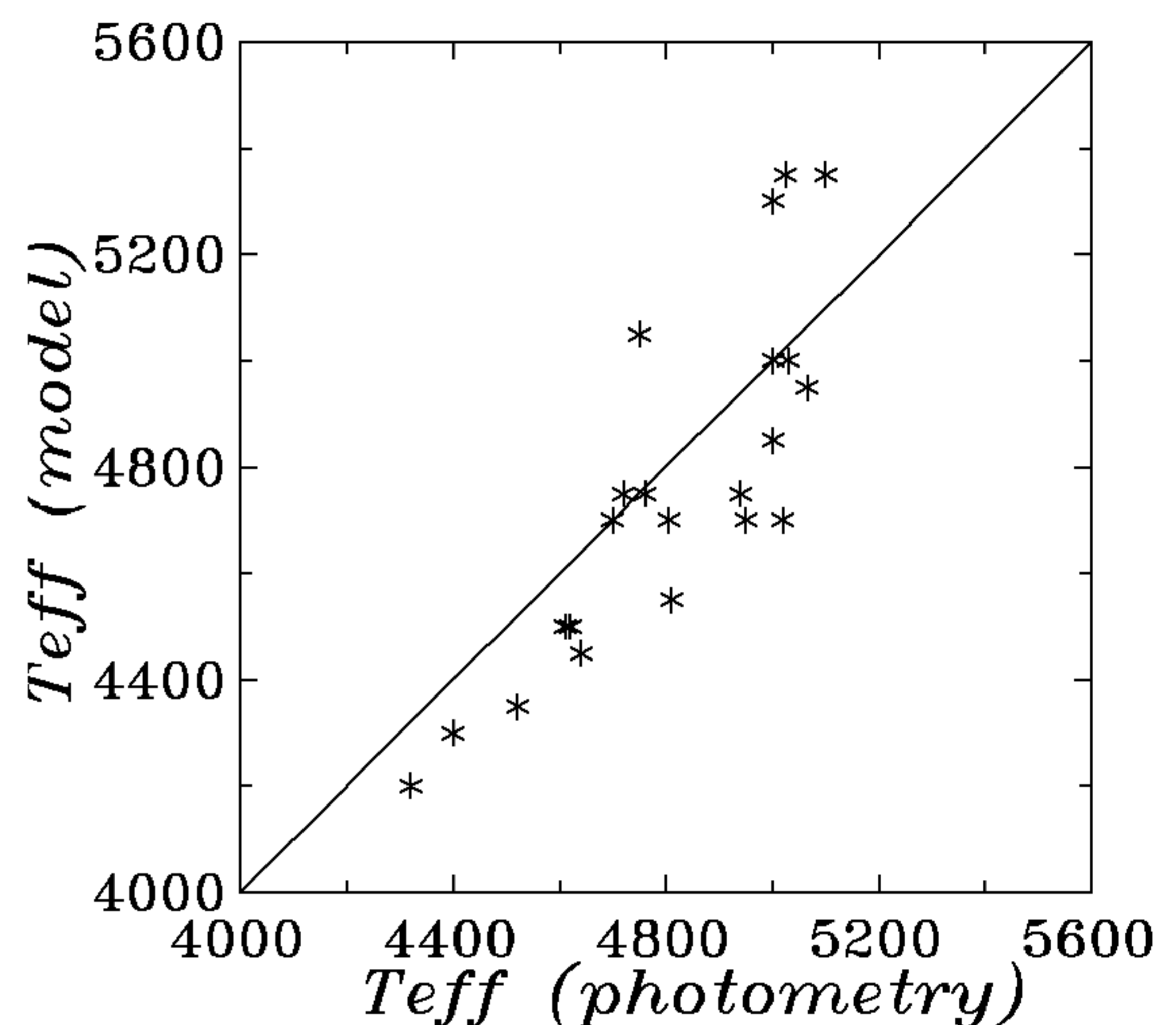


Figure 1. The comparison of temperatures.

In our paper the preliminary results of the calculations of synthetic spectra using the different grids of models of atmospheres (Bell et al., 1976, Kurucz, 1979, Kurucz, 1988, Kurucz, 1993a) and their comparison with observed spectra (Dragunova et al., 1997) are presented. The comparison was made in the following way:

- the calculated synthetic spectrum was interpolated for interval temperatures 50K ;
- the point nearly "continuum" was selected (maximum flux);
- the seven points was used to study the coincidence of synthetic and observed spectrum ;
- the minimal differences was found for selected grid of values T_{eff} , $\log g$ and $[\text{Fe}/\text{H}]$.

The obtained parameters of the cool giants atmospheres are given in the Table 1.

The parameters of several cool stars are obtained too and are given in the Table 2. The Figure 1 is presenting the comparison of

Table 1. The parameters of stellar atmospheres.

Sp	T _{eff}	lg g	[Fe/H]
G0III	5550	2.5	-1
G8III	5050	2.5	-1
G9III	5150	2.5	-1
K0III	4900	2.5	-1
K1III	4700	2.5	-1
K2III	4650	2.5	-1
K3III	4350	2.5	-1

T_{eff} calculated using the grid of models (Kurucz, 1993a) and T_{eff} received by means of the photometry for 22 stars.

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Table 2. The parameters of stars.

BS	Sp	T _{eff}	lg g	[Fe/H]
6132	G8III	4950	2.5	-1
265	G8III-IV	4550	3.0	-1
271	G8III-IV	5000	2.5	-1
4100	G8III-IV	4700	2.5	-1
5787	G8III-IV	4700	3.0	-1
7478	G8III-IV	4850	2.5	-1
4471	G9III	5000	2.5	-0.5
4932	G9III	5350	2.5	-0.5
7754	G9III	5300	2.5	-1
188	K0III	4850	2.5	-1
2990	K0III	5150	2.5	-1
3547	K0III	5050	2.5	-0.5
4057	K0III	4350	2.5	-1
4301	K0III	4700	2.5	-1
6698	K0III	4750	2.5	-1
7949	K0III	5050	2.5	-1
5025	K1III	5350	3.0	-1
6695	K1III	4850	2.5	-1
7150	K1III	4450	2.5	-0.5
7193	K1III	4900	2.5	-1
7324	K1III	4500	3.0	-0.5
8173	K1III	4750	2.5	-1
8694	K1III	5050	2.5	-1
74	K2III	4650	2.5	-1
334	K2III	4750	2.5	-1
603	K2III	4300	2.5	-1
617	K2III	4500	2.5	-0.5
1481	K2III	4700	2.5	-1
5340	K2III	4200	2.5	-1
5854	K2III	4850	2.5	-1
6603	K2III	4550	2.5	-1
6913	K2III	4800	2.5	-1
165	K3III	4450	2.5	-1
464	K3III	4350	2.5	-1
3748	K3III	4200	2.5	-1
3845	K3III	4150	2.5	-1
5429	K3III	4300	2.5	-1
5947	K3III	4300	2.5	-1
6973	K3III	4450	2.5	-1