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Determination of effective temperatures for an extended sample of dwarfs and subdwarfs (F0-K5)*

A. Alonso, S. Arribas and C. Martínez-Roger

Instituto de Astrofísica de Canarias, E-38200 La Laguna (Tenerife), Spain
Electronic mail: aas@ll.iac.es, sam@ll.iac.es and cmr@ll.iac.es

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Abstract. — We have applied the InfraRed Flux Method (IRFM) to a sample of 475 dwarfs and subdwarfs in order to derive their effective temperatures with a mean accuracy of about 1.5%. We have used the new homogeneous grid of theoretical model atmosphere flux distributions developed by Kurucz (1991, 1993) for the application of the IRFM. The atmospheric parameters of the stars cover, roughly, the ranges: 3500 K $\leq T_{\rm eff} \leq$ 8000 K; $-3.5 \leq$ [Fe/H] $\leq +0.5$; $3.5 \leq \log(g) \leq 5$. The monocromatic infrared fluxes at the continuum, and the bolometric fluxes are derived using recent results, which satisfy the accuracy requeriments of the work. Photometric calibrations have been revised and applied to estimate metallicities, although direct spectroscopic determinations were preferred when available. The adopted infrared absolute flux calibration, based on direct optical measurements of angular stellar diameters, sets the effective temperatures determined using the IRFM on the same scale than those obtained by direct methods. We derive three temperatures, T_J, T_H and T_K, for each star using the monochromatic fluxes at different infrared wavelengths in the photometric bands J, H, and K. They show good consistency over 4000 K, and no trend with wavelength may be appreciated. We provide a detailed description of the steps followed for the application of the IRFM, as well as the sources of the errors associated to the different inputs of the method, and their transmission into the final temperatures. We also provide comparison with previous works.

Key words: stars: fundamental parameters — stars: Population II — stars: subdwarfs — stars: general

1. Introduction

The stellar effective temperatures might be, in principle, determined following a fundamental or *direct* method based on the combination of the bolometric fluxes and the angular diameter measurements according to the equation:

$$T_{\rm eff} = (\frac{4}{\sigma})^{1/4}\theta^{-1/2}F_{\rm Bol}^{1/4}, \quad (1)$$

where σ is the Stefan-Boltzmann constant, θ is the angular diameter of the star, and $F_{\rm Bol}$ is the bolometric flux measured on the surface of the earth.

However, in practice, we need atmosphere models to perform secondary corrections to both the angular diameter measurement (limb darkening) and $F_{\rm Bol}$ (interstellar absorption). The Sun is obviously the only exception, since its limb darkening can be empirically determined, and its interstellar absorption is negligible. In any event, the main difficulty affecting the *direct* procedure is the limited number of stars with a reliable measurement of their angular diameter (see for instance Table 4 from Mozurkewich et al. 1991). This problem is remarkably severe for the low main sequence, as there are no direct measurements of angular diameter for stars later than F5V, with the above mentioned exception of the Sun. For this reason, relatively large uncertainties still remain on the scale of stellar effective temperatures in the low main sequence, especially when the effect of metallicity is considered.

Thus, we are compelled to use *semi-direct* methods, which require, as a basis, atmosphere models in addition to observational information (see the review by Böhm-Vitense 1981). Among the different methods of this type the Infrared Flux Method (hereafter IRFM; Blackwell et al. 1990, and references therein) seems especially adequate to analyse the temperatures of F, G, and K stars. The IRFM has been successfully applied to different samples of population I stars (e.g. Blackwell et al. 1990; Bell & Gustafsson 1989; Saxner & Hammarbäck 1985). However, the works based on the IRFM devoted to metal poor stars (Magain 1987; Arribas & Martínez-Roger 1987, 1989) are restricted to rather limited samples.

The present paper is part of a long term programme aimed to a better definition of the scale of temperatures

Send offprint requests to: A. Alonso

*Table 4 is only available in electronic form at CDS Tables 1-3 are also available via ftp 130.79.128.5

Table 1. The calibration of q- and R- factors versus metallicity, log(g) and effective temperature in $\lambda_{\rm eff}$=1272.5 nm (band J), computed using models by Kurucz (1991, 1993). The units of R-factors are (nm)

		[Fe/H]=0.50		[Fe/H]=0.00		[Fe/H]=-1.0		[Fe/H]=-2.0		[Fe/H]=-3.0		[Fe/H]=-3.5	
$T_{\rm eff}$	log(g)	$q(J)$	log(R_J)	$q(J)$	log(R_J)	$q(J)$	log(R_J)	$q(J)$	log(R_J)	$q(J)$	log(R_J)	$q(J)$	log(R_J)
3500	4.00	1.0106	3.19600	1.0114	3.22780	1.0117	3.25210	1.0098	3.30328	1.0108	3.26472		—
3500	5.00	1.0130	3.20760	1.0126	3.23414	1.0113	3.25917	1.0091	3.29874	—		—	—
3750	4.00	1.0116	3.22553	1.0104	3.25863	1.0110	3.27561	1.0107	3.28295	1.0107	3.28288	1.0101	3.28121
3750	5.00	1.0133	3.23491	1.0123	3.26000	1.0115	3.27746	1.0105	3.28175	--	—	—	—
4000	4.00	1.0127	3.26184	1.0104	3.28485	1.0098	3.30197	1.0098	3.30535	1.0099	3.30587	1.0100	3.30612
4000	5.00	1.0134	3.26260	1.0118	3.28772	1.0112	3.29982	1.0103	3.30418	--	·	—	—
4250	4.00	1.0140	3.29432	1.0116	3.31003	1.0096	3.32287	1.0090	3.32065	1.0097	3.33102	1.0099	3.33284
4250	5.00	1.0143	3.30331	1.0116	3.31139	1.0100	3.32123	1.0096	3.33045	1.0095	3.33336	·	
4500	4.00	1.0153	3.32227	1.0127	3.33544	1.0099	3.34905	1.0090	3.35719	1.0090	3.36207	1.0089	3.36356
4500	5.00	1.0154	3.32178	1.0124	3.33545	1.0095	3.34937	1.0093	3.35863	1.0093	3.36555	1.0092	3.36496
4750	4.00	1.0161	3.35022	1.0134	3.36348	1.0100	3.37006	1.0083	3.38917	1.0080	3.39160	1.0083	3.39627
4750	5.00	1.0164	3.35047	1.0131	3.36356	1.0100	3.37815	1.0090	3.38952	1.0087	3.39551	1.0086	3.39743
5000	4.00	1.0163	3.38036	1.0138	3.39394	1.0100	3.41156	1.0083	3.42269	1.0080	3.42904	1.0080	3.43060
5000	5.00	1.0170	3.38078	1.0137	3.39440	1.0101	3.41047	1.0085	3.42258	1.0085	3.42892	1.0079	3.43067
5250	4.00	1.0166	3.41261	1.0141	3.42659	1.0096	3.44617	1.0082	3.45863	1.0077	3.46469	1.0076	3.46806
5250	5.00	1.0174	3.41282	1.0140	3.42685	1.0095	3.44491	1.0083	3.45797	1.0081	3.46427	1.0081	3.46582
5500	4.00	1.0168	3.44008	1.0140	3.46095	1.0094	3.45780	1.0081	3.49427	1.0078	3.50020	1.0077	3.50134
5500	5.00	1.0173	3.44647	1.0139	3.46074	1.0094	3.48067	1.0083	3.49368	1.0079	3.50122	1.0079	3.50120
5750	4.00	1.0168	3.48326	1.0134	3.49057	1.0097	3.51767	1.0084	3.53000	1.0080	3.53513	1.0080	3.53622
5750	5.00	1.0165	3.48180	1.0132	3.49609	1.0096	3.51676	1.0081	3.53009	1.0078	3.53595	1.0077	3.53714
6000	4.00	1.0164	3.51836	1.0134	3.53206	1.0090	3.55044	1.0080	3.56496	1.0083	3.57055	1.0082	3.57064
6000	5.00	1.0167	3.51741	1.0131	3.53169	1.0097	3.55340	1.0084	3.56613	1.0080	3.57110	1.0079	3.57223
6250	4.00	1.0156	3.55398	1.0131	3.56781	1.0098	3.58846	1.0090	3.59864	1.0086	3.60324	1.0086	3.60424
6250	5.00	1.0161	3.55329	1.0131	3.56737	1.0097	3.58942	1.0088	3.60122	1.0084	3.60596	1.0082	3.60701
6500	4.00	1.0156	3.58941	1.0120	3.60338	1.0097	3.62284	1.0092	3.63226	1.0090	3.63617	1.0090	3.63708
6500	5.00	1.0144	3.58912	1.0115	3.60342	1.0096	3.63197	1.0088	3.63570	1.0085	3.64011	1.0087	3.64095
6750	4.00	1.0141	3.62508	1.0111	3.63976	1.0088	3.65093	1.0080	3.66329	1.0082	3.66895	1.0083	3.66976
6750	5.00	1.0136	3.62471	1.0106	3.63012	1.0083	3.65066	1.0080	3.66066	1.0076	3.67373	1.0077	3.67454
7000	4.00	1.0132	3.66083	1.0108	3.67340	1.0070	3.69043	1.0072	3.69820	1.0075	3.70130	1.0073	3.70206
7000	5.00	1.0117	3.66015	1.0096	3.67105	1.0072	3.69368	1.0065	3.70300	1.0059	3.70684	1.0058	3.70762
7250	4.00	1.0123	3.69064	1.0095	3.70831	1.0069	3.73069	1.0058	3.73100	1.0056	3.73084	1.0060	3.73421
7250	5.00	1.0100	3.69541	1.0073	3.70925	1.0061	3.73039	1.0050	3.73376	1.0051	3.73896	1.0047	3.73971
7500	4.00	1.0093	3.73444	1.0063	3.74712	1.0050	3.75715	1.0047	3.76113	1.0044	3.76047	1.0045	3.76079
7500	5.00	1.0075	3.73039	1.0050	3.74321	1.0037	3.76023	1.0031	3.76756	1.0032	3.77089	1.0035	3.77124
7750	4.00	1.0072	3.77085	1.0044	3.78257	1.0022	3.79767	1.0013	3.80445	1.0019	3.80077	1.0016	3.80738
7750	5.00	1.0054	3.76527	1.0035	3.77745	1.0015	3.79300	1.0020	3.79059	1.0014	3.80247	1.0016	3.80281
8000	4.00	1.0058	3.80008	1.0030	3.81799	1.0008	3.83178	1.0004	3.83765	1.0004	3.83083	1.0000	3.84044
8000	5.00	0.9997	3.80371	1.0011	3.81155	1.0000	3.82530	0.9998	3.83155	1.0000	3.83368	0.9995	3.83429
8250	4.00	1.0046	3.84277	1.0021	3.85335	0.9996	3.86050	0.9991	3.87194	0.9991	3.87373	0.9992	3.87400
8250	5.00	0.9965	3.84935	0.9959	3.85113	0.9999	3.86589	0.9973	3.86044	0.9973	3.86587	0.9974	3.86617

for F, G, and K dwarfs and subdwarfs, using the IRFM. This work is relevant to three main topics: (a) analysis of the global behaviour of atmosphere models (e.g., Magain 1987), (b) the correct interpretation of the observed HR diagram (e.g., Arribas & Martínez-Roger 1988, 1989), and (c) fine spectroscopic analysis for abundance determinations of metal poor stars (e.g., King 1994).

The general programme has been focussed on the improvement of the different factors which affect the accuracy in the definition of the temperature scale. Firstly, the sample of selected stars has been substantially enlarged compared to previous works (up to almost 500 stars). This point is particularly important in order to properly sample wide ranges in colour and metallicity. The accurate infrared photometry required for the application of the IRFM was measured for 75% of the stars in the sample (Alonso et al. 1994a, Paper I). Secondly, due to the sensitivity of the IRFM temperatures to the infrared absolute flux calibration considered, this subject was revised in Alonso et al. (1994b, Paper II). There, a new absolute calibration for the infrared flux of Vega, which scales the IRFM temperatures to those derived by direct methods, is proposed. Thirdly, a method to obtain bolometric fluxes for metal poor stars was devised in Alonso et al. (1995, Paper III). Last, but not least, we have used the improved grid of atmosphere models computed recently by Kurucz (1991, 1993).

This paper provides detailed information on the procedure followed to derive the effective temperatures for the whole sample. The paper is laid out as follows. Section 2 explains the practical implementation of the IRFM. The theoretical and observational inputs of the method, as applied here, have been separated in order to discuss the influence of errors in the derived temperatures. Thus, Sect. 3 analyses the theoretical R- and q-factors, and the observational inputs are discussed in Sect. 4. This section also includes a description of the criteria adopted to collect the sample of stars, a revision of photometric calibrations to estimate the metallicity, and the correction of interstellar extinction. The effective temperatures are derived

Table 2. The same that Table 1 for $\lambda_{\rm eff}$=1635.0 nm (band H)

		[Fe/H]=0.50		[Fe/H]=0.00		[Fe/H]=-1.0		[Fe/H]=-2.0		[Fe/H]=-3.0		[Fe/H]=-3.5	
T_{ef}	$log(g)$	$q(H)$	$log(R_H)$	$q(H)$	$log(R_H)$	$q(H)$	$log(R_H)$	$q(H)$	$log(R_H)$	$q(H)$	$log(R_H)$	$q(H)$	$log(R_H)$
3500	4.00	1.0855	3.27481	1.0710	3.29198	1.0572	3.35350	1.0558	3.40373	1.0522	3.36870	—	—
3500	5.00	1.0577	3.30845	1.0550	3.33420	1.0552	3.35579	1.0502	3.40015	—	—	—	—
3750	4.00	1.0873	3.27100	1.0795	3.30519	1.0578	3.38672	1.0486	3.41153	1.0444	3.41307	1.0418	3.42357
3750	5.00	1.0618	3.33578	1.0536	3.37801	1.0483	3.40675	1.0466	3.41366	—	—	—	—
4000	4.00	1.0725	3.33562	1.0740	3.34393	1.0556	3.39405	1.0483	3.44312	1.0373	3.47083	1.0358	3.48011
4000	5.00	1.0637	3.36523	1.0578	3.40463	1.0459	3.44771	1.0443	3.48268	—	—	—	—
4250	4.00	1.0623	3.40413	1.0629	3.40631	1.0589	3.43010	1.0458	3.47769	1.0338	3.51515	1.0306	3.52892
4250	5.00	1.0599	3.41079	1.0578	3.42979	1.0486	3.47239	1.0384	3.50456	1.0316	3.52539	—	—
4500	4.00	1.0520	3.47101	1.0522	3.47245	1.0489	3.49194	1.0416	3.52341	1.0335	3.55807	1.0318	3.56514
4500	5.00	1.0522	3.46793	1.0517	3.47403	1.0405	3.50464	1.0355	3.54761	1.0278	3.57009	1.0261	3.56300
4750	4.00	1.0426	3.53488	1.0431	3.53646	1.0410	3.55421	1.0368	3.57970	1.0328	3.59017	1.0319	3.60341
4750	5.00	1.0438	3.52861	1.0435	3.53363	1.0407	3.55529	1.0320	3.59400	1.0370	3.61848	1.0263	3.62325
5000	4.00	1.0349	3.59562	1.0348	3.59855	1.0349	3.61329	1.0328	3.63455	1.0307	3.64691	1.0305	3.64878
5000	5.00	1.0361	3.58951	1.0367	3.59330	1.0345	3.61349	1.0298	3.64271	1.0264	3.66031	1.0262	3.66277
5250	4.00	1.0277	3.65441	1.0290	3.65615	1.0303	3.67122	1.0291	3.68812	1.0287	3.69488	1.0287	3.69601
5250	5.00	1.0306	3.64750	1.0300	3.65203	1.0298	3.67091	1.0266	3.69392	1.0255	3.70304	1.0255	3.70556
5500	4.00	1.0225	3.70927	1.0238	3.71246	1.0262	3.72661	1.0261	3.73905	1.0265	3.74339	1.0267	3.74428
5500	5.00	1.0237	3.70350	1.0244	3.70833	1.0254	3.72553	1.0230	3.74356	1.0241	3.74941	1.0238	3.75138
5750	4.00	1.0185	3.76271	1.0200	3.76593	1.0224	3.77988	1.0235	3.78928	1.0240	3.79211	1.0243	3.79275
5750	5.00	1.0180	3.75695	1.0200	3.76171	1.0217	3.77848	1.0218	3.79200	1.0222	3.79566	1.0223	3.79631
6000	4.00	1.0149	3.81381	1.0165	3.81775	1.0191	3.83037	1.0204	3.83758	1.0207	3.84048	1.0208	3.84119
6000	5.00	1.0147	3.80859	1.0160	3.81377	1.0186	3.82919	1.0195	3.83904	1.0199	3.84258	1.0192	3.84339
6250	4.00	1.0125	3.86315	1.0136	3.86848	1.0163	3.87899	1.0172	3.88494	1.0174	3.88762	1.0175	3.88823
6250	5.00	1.0111	3.85858	1.0125	3.86451	1.0150	3.87745	1.0165	3.88548	1.0169	3.88860	1.0170	3.88927
6500	4.00	1.0096	3.91178	1.0108	3.91666	1.0135	3.92616	1.0144	3.93139	1.0147	3.93371	1.0147	3.93425
6500	5.00	1.0079	3.90710	1.0094	3.91263	1.0127	3.92440	1.0130	3.93008	1.0142	3.93378	1.0143	3.93454
6750	4.00	1.0074	3.95819	1.0084	3.96332	1.0111	3.97205	1.0118	3.97671	1.0119	3.97885	1.0120	3.97931
6750	5.00	1.0052	3.95350	1.0065	3.95930	1.0100	3.96970	1.0110	3.97574	1.0112	3.97820	1.0113	3.97871
7000	4.00	1.0060	4.00306	1.0067	4.00827	1.0089	4.01650	1.0092	4.02102	1.0094	4.02274	1.0094	4.02318
7000	5.00	1.0028	3.99828	1.0037	4.00433	1.0070	4.01417	1.0079	4.01958	1.0080	4.02163	1.0081	4.02206
7250	4.00	1.0043	4.04670	1.0048	4.05220	1.0070	4.05900	1.0073	4.06405	1.0074	4.06561	1.0075	4.06594
7250	5.00	1.0009	4.04182	1.0013	4.04810	1.0040	4.05751	1.0049	4.06215	1.0053	4.06412	1.0053	4.06455
7500	4.00	1.0006	4.09372	1.0002	4.09354	1.0051	4.10260	1.0055	4.10620	1.0058	4.10755	1.0058	4.10785
7500	5.00	0.9980	4.08471	0.9984	4.09078	1.0019	4.09945	1.0022	4.10385	1.0024	4.10565	1.0025	4.10597
7750	4.00	0.9991	4.13608	0.9991	4.14254	1.0013	4.15009	1.0020	4.15402	1.0016	4.15643	1.0023	4.15642
7750	5.00	0.9957	4.12625	0.9966	4.13211	0.9980	4.14090	0.9994	4.14475	1.0001	4.14607	0.9999	4.14651
8000	4.00	0.9989	4.17849	0.9974	4.18470	1.0001	4.19202	0.9997	4.19080	1.0000	4.19818	0.9998	4.19851
8000	5.00	0.9914	4.17145	0.9935	4.17332	0.9965	4.18111	0.9967	4.18485	0.9971	4.18613	0.9976	4.18614
8250	4.00	0.9985	4.21874	0.9973	4.22521	0.9980	4.23300	0.9986	4.23770	0.9988	4.23907	0.9993	4.23908
8250	5.00	0.9893	4.21363	0.9877	4.22014	0.9905	4.22567	0.9921	4.22954	0.9941	4.22578	0.9949	4.22581

in Sect. 5, where the internal consistency of the method and the uncertainties affecting $T_{\rm eff}$ are assesed. The final temperatures are compared to common determinations of previous works in Sect. 6. Finally, in Sect. 7, the main results are briefly summarized.

In a forthcoming paper, we will provide and discuss the calibrations $T_{\rm eff}$-colours-[Fe/H], as well as the mean intrinsic colours for dwarfs and subdwarfs.

2. The implementation of the IRFM

The InfraRed Flux Method (Blackwell et al. 1990) uses the quotient between the bolometric flux ($F_{\rm Bol}$) and the monochromatic flux at a chosen infrared wavelength of the continuum ($F(\lambda_{\rm IR})$), both measured at the surface of the earth, as indicator of $T_{\rm eff}$. This quotient is the so-called observational R-factor ($R_{\rm obs}$). The theoretical counterpart derived from models, $R_{\rm theo}$, is obtained as the quotient between the integrated flux ($\sigma T_{\rm eff}^4$) and the monochromatic flux at $\lambda_{\rm IR}$ ($F_{\rm mod}(\lambda_{\rm IR})$), at the surface of the star. Thus the basic equation of the IRFM reads:

$$R_{\rm obs} = \frac{F_{\rm Bol}}{F(\lambda_{\rm IR})} = \frac{\sigma T_{\rm eff}^4}{F_{\rm mod}(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g)} = = R_{\rm theo}(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g), \qquad (2)$$

where the explicit dependence on metallicity, surface gravity, and $\lambda_{\rm IR}$ is taken into account. The IRFM only requires from models the correct prediction of the continuum IR fluxes (note that the bolometric flux at the stellar surface is fixed by the value of $T_{\rm eff}$). This requirement seems relatively easier to fulfill, if compared to those demanded by other *semi-direct* methods. In particular, free-free and bound-free transitions of H^- ion, the main source of the continuum opacity in the IR for F,G and K stars, are relatively well understood. Therefore, in principle, the dependence on models is not a critical point to the IRFM, at least for spectral types earlier than late K where the IR opacity due to molecular bands is of minor importance. Another advantage of the IRFM, as explained in Sect. 4.1,

Table 3. The same that Table 1 for $\lambda_{\rm eff}$=2175.0 nm (band K)

		[Fe/H]=0.50		[Fe/H]=0.00		[Fe/H]=-1.0		[Fe/H]=-2.0		[Fe/H]=-3.0		[Fe/H]=-3.5	
$T_{\rm eff}$	$\log(g)$	$q(K)$	$\log(R_K)$	$q(K)$	$\log(R_K)$	$q(K)$	$\log(R_K)$	$q(K)$	$\log(R_K)$	$q(K)$	$\log(R_K)$	$q(K)$	$\log(R_K)$
3500	4.00	1.0451	3.62077	1.0390	3.67040	1.0340	3.71134	1.0270	3.80720	1.0261	3.72061	—	—
3500	5.00	1.0415	3.67386	1.0352	3.69621	1.0316	3.71324	1.0253	3.79841	—	—	—	—
3750	4.00	1.0442	3.68243	1.0379	3.71302	1.0312	3.76466	1.0260	3.78006	1.0237	3.78449	1.0230	3.78616
3750	5.00	1.0383	3.72570	1.0340	3.75590	1.0293	3.77601	1.0250	3.78110		-	—	
4000	4.00	1.0410	3.75541	1.0362	3.76628	1.0257	3.80318	1.0243	3.82875	1.0226	3.84445	1.0223	3.84950
4000	5.00	1.0362	3.77543	1.0310	3.80467	1.0267	3.83105	1.0233	3.84071	--			
4250	4.00	1.0378	3.82777	1.0343	3.83286	1.0275	3.84872	1.0226	3.87759	1.0218	3.89022	1.0217	3.90854
4250	5.00	1.0339	3.83328	1.0293	3.84842	1.0238	3.87605	1.0227	3.89458	1.0217	3.90679	—	—
4500	4.00	1.0345	3.88700	1.0309	3.90121	1.0254	3.91256	1.0217	3.93235	1.0207	3.95498	1.0208	3.95942
4500	5.00	1.0311	3.89437	1.0274	3.90191	1.0225	3.92210	1.0211	3.94782	1.0202	3.96536	1.0211	3.96969
4750	4.00	1.0304	3.96302	1.0279	3.96679	1.0207	3.97732	1.0205	3.99602	1.0200	4.00734	1.0202	4.00900
4750	5.00	1.0277	3.95866	1.0248	3.96410	1.0216	3.97813	1.0204	4.00293	1.0207	4.01704	1.0206	4.02038
5000	4.00	1.0266	4.02573	1.0250	4.02559	1.0216	4.03988	1.0196	4.05472	1.0197	4.06150	1.0198	4.06273
5000	5.00	1.0243	4.02145	1.0225	4.02617	1.0208	4.03902	1.0198	4.05822	1.0202	4.06821	1.0204	4.06975
5250	4.00	1.0230	4.08471	1.0221	4.08605	1.0192	4.10008	1.0194	4.11122	1.0197	4.11577	1.0197	4.11661
5250	5.00	1.0212	4.08121	1.0202	4.08603	1.0197	4.09862	1.0198	4.11309	1.0198	4.11918	1.0199	4.12089
5500	4.00	1.0197	4.14173	1.0190	4.14541	1.0188	4.15745	1.0192	4.16504	1.0192	4.16946	1.0191	4.17164
5500	5.00	1.0176	4.13860	1.0178	4.14344	1.0188	4.15641	1.0196	4.16605	1.0196	4.17167	1.0194	4.17386
5750	4.00	1.0163	4.19646	1.0166	4.20054	1.0181	4.21059	1.0185	4.21878	1.0184	4.22314	1.0182	4.22382
5750	5.00	1.0143	4.19439	1.0154	4.19889	1.0181	4.20925	1.0185	4.21954	1.0185	4.22462	1.0184	4.22519
6000	4.00	1.0134	4.24828	1.0145	4.25344	1.0168	4.26199	1.0174	4.26973	1.0173	4.27404	1.0173	4.27468
6000	5.00	1.0115	4.24731	1.0134	4.25107	1.0166	4.26245	1.0177	4.27046	1.0177	4.27516	1.0179	4.27578
6250	4.00	1.0115	4.29964	1.0130	4.30314	1.0156	4.31330	1.0163	4.32077	1.0164	4.32337	1.0165	4.32378
6250	5.00	1.0093	4.30826	1.0112	4.30184	1.0145	4.31316	1.0155	4.32174	1.0161	4.32444	1.0161	4.32505
6500	4.00	1.0100	4.34713	1.0115	4.35227	1.0135	4.36213	1.0144	4.36897	1.0140	4.37126	1.0140	4.37176
6500	5.00	1.0082	4.34632	1.0092	4.35116	1.0125	4.36224	1.0133	4.37017	1.0136	4.37262	1.0138	4.37311
6750	4.00	1.0085	4.39470	1.0098	4.39997	1.0118	4.40947	1.0126	4.41564	1.0128	4.41770	1.0130	4.41810
6750	5.00	1.0040	4.39381	1.0066	4.39929	1.0103	4.41134	1.0113	4.41698	1.0115	4.41915	1.0119	4.41966
7000	4.00	1.0066	4.44707	1.0077	4.44648	1.0103	4.45648	1.0108	4.46099	1.0108	4.46230	1.0109	4.46269
7000	5.00	1.0012	4.44002	1.0037	4.44576	1.0075	4.45739	1.0087	4.46243	1.0087	4.46391	1.0089	4.46431
7250	4.00	1.0043	4.48659	1.0055	4.49174	1.0078	4.50137	1.0086	4.50533	1.0084	4.50652	1.0085	4.50682
7250	5.00	0.9982	4.48525	1.0004	4.49114	1.0041	4.50223	1.0051	4.50618	1.0053	4.50817	1.0056	4.50840
7500	4.00	0.9965	4.53501	0.9984	4.54125	1.0058	4.54527	1.0056	4.54912	1.0061	4.55019	1.0063	4.55038
7500	5.00	0.9951	4.52939	0.9973	4.53652	1.0007	4.54575	1.0015	4.54937	1.0020	4.55108	1.0021	4.55130
7750	4.00	0.9970	4.58211	0.9973	4.58901	1.0000	4.59797	1.0001	4.60170	1.0003	4.60329	1.0003	4.60361
7750	5.00	0.9918	4.57381	0.9932	4.57984	0.9969	4.58346	0.9975	4.59166	0.9980	4.59335	0.9983	4.59340
8000	4.00	0.9950	4.62493	0.9957	4.63164	0.9985	4.64032	0.9986	4.64361	0.9987	4.64527	0.9987	4.64554
8000	5.00	0.9840	4.62367	0.9883	4.62291	0.9924	4.62991	0.9936	4.63323	0.9940	4.63458	0.9941	4.63472
8250	4.00	0.9954	4.66672	0.9949	4.67282	0.9970	4.68100	0.9978	4.68481	0.9978	4.68615	0.9978	4.68639
8250	5.00	0.9818	4.66525	0.9829	4.67207	0.9851	4.68070	0.9853	4.68246	0.9891	4.67637	0.9894	4.67609

is the large sensitivity of R-factors to the effective temperature ($R \sim T_{\rm eff}^3$) and their slight dependence on the secondary atmospheric parameters. Therefore, the uncertainties in the derived effective temperature associated to errors in the gravity and metallicity assignment are small compared to those due to the determination of the bolometric and monochromatic fluxes.

The monochromatic fluxes are obtained by applying the relation

$$F(\lambda_{\rm IR}) = q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g)\ [F_{\rm cal}(\lambda_{\rm IR}) 10^{-0.4(m-m_{\rm cal})}] \qquad (3)$$

where m and $m_{\rm cal}$ are, respectively, the magnitudes of the problem and standard star, $\lambda_{\rm IR}$ is the selected wavelength at the infrared (which should be close to the maximum transmission of the photometric band), $F_{\rm cal}(\lambda_{\rm IR})$ is the absolute flux of the standard star at $\lambda_{\rm IR}$, and $q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g)$ is a dimensionless factor which corrects the effect of the different curvature of the flux density distribution, across the filter window, between the standard and the problem stars (see Sect. 3.2 for further details).

Table 5. The influence of the reddening and the uncertainty in the Calibration of the Absolute Flux in the IR (CAFIR) on the temperatures derived using IRFM. The errors induced by the uncertainties on the absolute flux calibration are slightly overestimated, since the change in the bolometric flux has not been taken into account

		Error on T_{ef} (%)				
Input parameter	Error	3500	4000	5000	6000	7500
E(B-V)	0.05 mag	2.1	1.6	2.6	3.6	4.5
CAFIR J [Fe/H]=0.0	3 %	2.75	3	2	1.4	1.2
CAFIR J [Fe/H]=−3.0	3 %	3.25	2.75	2	1.4	1.2
CAFIR H [Fe/H]=0.0	4 %	6	1.6	1.4	1.2	1.2
CAFIR H [Fe/H]=−3.0	4 %	1.75	2	1.75	1.2	1.2
CAFIR K [Fe/H]=0.0	4 %	2.4	1.4	1.4	1.2	1.2
CAFIR K [Fe/H]=−3.0	4 %	1.6	1.6	1.4	1.2	1.2
CAFIR mean	—	2.0	1.7	1.6	1.25	1.2

The separation of observational inputs and theoretical factors for the implementation of the IRFM is provided

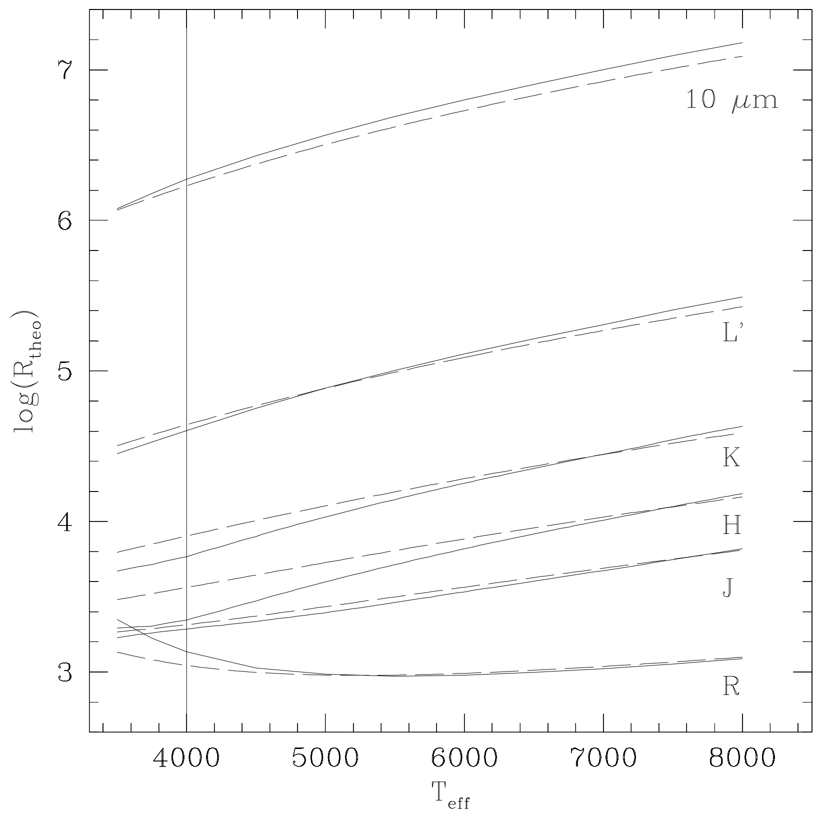

Fig. 1. $R_{\rm theo}$ factors computed using solar metallicity models developed by Kurucz (1991). The wavelengths considered are $\lambda_R = 790$ nm, $\lambda_J = 1272.5$ nm, $\lambda_H = 1635$ nm, $\lambda_K = 2175$ nm, $\lambda_{L'} = 3690$ nm, and a point in the far IR at 10 μm. The dashed lines correspond to $R_{\rm theo}$ factors derived from blackbody flux densities. The vertical line ($T_{\rm eff}$=4000 K) shows the lower limit of applicability of IRFM with these models

Table 6. Mean accidental errors of the effective temperature derived applying the IRFM in the band K

		Error on T_{ef} (%)				
Input parameter	Error	3500 K	4000 K	5000 K	6000 K	7500 K
qR_{theo}	5 (%)	3	1.5	1.5	1.5	1.5
$log(g)$	0.5 dex	2	1.5	0.1	0.1	0.1
$[Fe/H]$	0.3 dex	1	0.75	0.15	0.15	0.15
Total		3.3	2	1.5	1.5	1.5

by substituting relation (3) in Eq. (2) as follows,

$$\frac{F_{\rm Bol}}{F_{\rm cal}(\lambda_{\rm IR})10^{-0.4(m-m_{\rm cal})}} =$$
$$= q(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g) R_{\rm theo}(\lambda_{\rm IR}, T_{\rm eff}, [{\rm Fe/H}], g) \quad (4)$$

Once [Fe/H] and log(g) are known for a certain star, the observational quantities on the left-hand side of Eq. (4) determine the star's effective temperature by comparing to the theoretical information from models on the right-hand side. It is worthy to notice that in a strict sense, models are also needed to obtain the integrated flux in order to

Table 7. Comparison between the temperatures derived in the present work (Col. 2) and those derived by Saxner & Hammarbäck (1985) (Col. 3). The mean difference $T_{\rm IRFM} - T_{\rm SH85}$ is 5±63 K

Star	T_{IRFM} (K)	T_{SH85} (K)	ΔT	ΔT (K) (%)
HR0458	6155	6140	15	0.24
HR0483	5874	5810	64	1.09
HR0937	5996	5890	106	1.77
HR1101	5998	5940	58	0.97
HR1543	6482	6470	12	0.19
HR1729	5847	5810	37	0.63
HR1983	6260	6260	0	0.00
HR2085	7013	7160	-147	-2.10
HR2852	7020	7060	-40	-0.57
HR2943	6579	6640	-61	-0.93
HR4540	6095	6120	-25	-0.41
HR4785	5867	5810	57	0.97
HR5447	6770	6760	10	0.15
HR5634	6571	6570	1	0.02
HR5868	5897	5890	7	0.12
HR5914	5774	5870	-96	-1.66
HR5933	6233	6220	13	0.21
HR8905	5954	5870	84	1.41

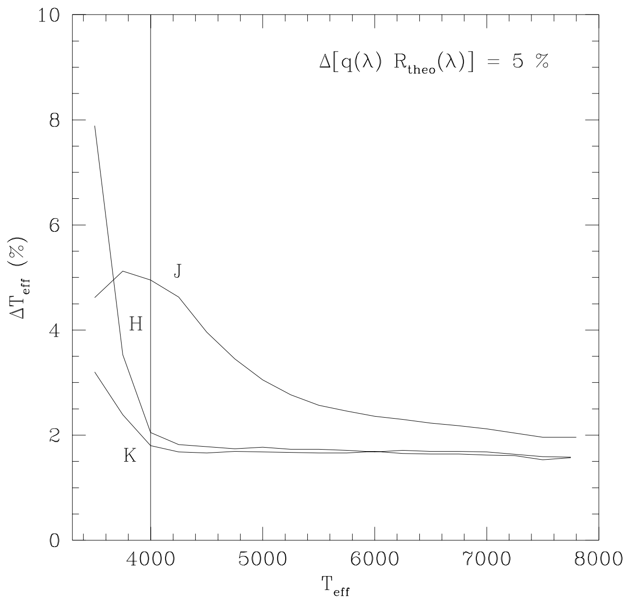

Fig. 2. Uncertainty on the IRFM temperature induced by an error of 5% in the observational quotient $\frac{F_{\rm Bol}}{F_{\rm cal}(\lambda_{\rm IR})10^{-0.4(m-m_{\rm cal})}}$

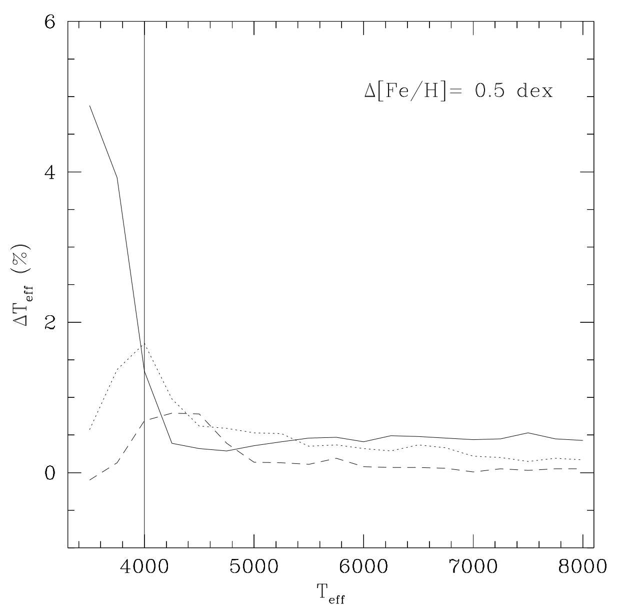

Fig. 3. Uncertainty on the IRFM temperature induced by an error of 0.5 dex in [Fe/H]. Solid line: change from [Fe/H]=0 to [Fe/H]=−0.5; dotted line: change from [Fe/H]=−1 to [Fe/H]=−1.5; dashed line: change from [Fe/H]=−2.5 to [Fe/H]=−3

complete the missed flux in the UV and far IR, however, these corrections are small (see for instance Petford et al. (1991) and Paper II).

3. Model information: The *R*– and *q*–factors

The theoretical flux density distributions used in this work to implement the IRFM were obtained using Kurucz's (1991, 1993) new models. Blackwell and Lynas-Gray (1994) have also used them for the application of the IRFM. These models are widely described in Kurucz (1991). Here we briefly summarize their features concerning the aims of the present programme:

1. The major difference concerning opacities is the use of new iron group atomic lines, which are expected to diminish the problem of the missing opacity in the UV (Magain 1987). The computed opacities consider the effect of 58 million lines both atomic and molecular (which increases in a factor of roughly 30 the number in old models). Diatomic molecules considered include H_2, SiO, CH, NH, OH, MgH, SiH, C_2, TiO, CN and CO. Regrettably the effects of triatomic molecules, as water vapor, are not considered. In the range 1.75−2.1 μm the contribution to the opacity from water vapour has great influence on the IR flux of cool stars ($T_{\rm eff} \leq$ 4500 K), specially for solar abundance. This fact sets a lower limit at late K stars for the applicability of the IRFM using these models (see Sect. 5).
2. The physics remains essentially the same that in older Kurucz's models (see Kurucz 1979a, b) since the problem of the opacity has been paid major attention. However, the new models contain slight improvements in the treatment of convention including approximative overshooting. The mixing length to scale height ratio (α/H) adopted is 1.25. The solar metal abundances are those derived by Anders & Grevesse (1989). The microturbulent velocity is 2 km/s.
3. From a practical point of view, the new models sample physical parameters in a denser grid: Abundances are sampled in 0.1 dex steps from [Fe/H]=1.00 to [Fe/H]=−0.5, and in 0.5 dex steps from [Fe/H]=−0.5 to [Fe/H]=−4.0. Gravities are sampled in 0.5 dex steps and temperatures in 250 K steps under 8000 K.
4. Model fluxes are sampled in 1221 points covering a wavelength interval from 9 to 160000 nm. The resolution ranges within 1 nm in the UV, 2 nm in the visible and the band J, 5 nm in the band H and 10 nm in the band K. The sampling in the near IR implies a remarkable improvement as far as previous models are concerned, which allows to avoid interpolations.

3.1. $R_{\rm theo}(\lambda_{\rm IR})$ *factors*

The flux density distributions of models described in the previous section have been used to calculate $R_{\rm theo}(\lambda_{\rm IR})$

Table 8. Comparison between the temperatures derived in the present work (Col. 2) and those derived by Magain (1987) (Col. 3). The mean difference $T_{\rm IRFM} - T_{\rm M87}$ is 112±56 K

Star	T_{IRFM} (K)	T_{M87} (K)	ΔT (K)	ΔT (%)
HD19445	6050	5933	117	1.93
HD64000(1)	5441	5370	71	1.36
HD74000	6224	6135	89	1.40
HD84937(2)	6330	6210	120	1.90
HD94028(3)	6001	5777	224	3.73
HD108177	6034	6026	8	0.01
HD132475	5788	5614	174	3.00
HD140283	5691	5607	84	1.47
BD +42 2667(4)	6059	5955	104	1.71
HD201891	5909	5761	148	2.56
HD219617	6012	5918	94	1.56

(1) G090-025
(2) G043-003
(3) G058-025
(4) G180-024

Table 9. Comparison between the temperatures derived in the present work (Col. 2) and those derived by Bell & Gustaffson (1989) (Col. 3). The mean difference $T_{\rm IRFM} - T_{\rm BG89}$ over 4500 K is −49±75 K

Star	T_{IRFM} (K)	T_{BL94} (K)	ΔT (K)	ΔT (%)
HR219	5817	5839	-22	-0.38
HR753	4718	4775	-57	-1.21
HR4785	5867	5861	6	0.10
HR4983	5964	6024	-60	-1.01
HR7503	5763	5826	-63	-1.09
HR7504	5767	5664	103	1.79
HR4496	5342	5552	-210	-3.93
HR7462	5227	5253	-26	-0.50
HR1325	5079	5114	-35	-0.69
HR1084	5076	5156	-80	-1.58
HR8832	4805	4896	-91	-1.89
HR8085	4323	4463	-140	-3.24
HR8086	3865	4252	-387	-10.01

factors, as defined in Eq. (2). The closest wavelengths to the effective wavelengths of the J, H, and K photometric bands sampled by the models were selected ($\lambda_J = 1272.5$ nm, $\lambda_H = 1635.0$ nm and $\lambda_K = 2175.0$ nm). The effective wavelengths were computed considering the instrumental response of the TCS system (Paper I), and the atmospheric transparency (Manduca & Bell 1979; Glass 1985; Mountain 1983). Tables 1-3 contain the theoretical values of $\log(R)$ for these three wavelengths. Effective temperatures cover the range 3500−8250 K, surface gravities cover the range $\log(g)$=(3.5, 5.0), and metallicities cover the range (0.5, −3.5).

Figure 1 shows the $\log(R)$ factors for solar metallicity. In addition to R-factors corresponding to the three wavelengths selected in this work, those corresponding to the R band (Johnson 1966) at $\lambda_R = 790$ nm, L' from TCS system (Paper II) at $\lambda_{L'} = 3690.0$ nm, and a far

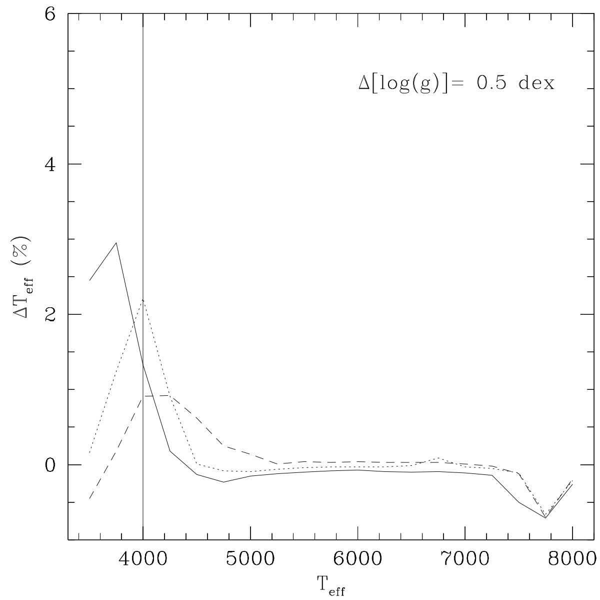

Fig. 4. Uncertainty on the IRFM temperature induced by an error of 0.5 dex in $\log(g)$. Solid line: [Fe/H]=0.0; dotted line: [Fe/H]=−1; dashed line: [Fe/H]=−2

IR point at 10004.0 nm have been also plotted to display their overall properties. The correlation of gradient $\Delta\ \log(R_{\rm theo})/\Delta T_{\rm eff}$ with wavelength may be appreciated in the figure (i.e. the sensitivity of R-factors to temperature increases with wavelength). The relation $\log(R_{\rm theo}) - T_{\rm eff}$ is double-valued for the band R, which implies that it is useless to apply the IRFM in the considered $T_{\rm eff}$ range.

Among the three wavenlengths considered in this work, the R_J factors are the least sensitive to temperature, especially for $T_{\rm eff}$ lower than 5000 K. The sensitivities of the R_H and R_K are comparable, although as will be discussed in Sect. 5, temperatures lower than 4000 K derived using R_H are less reliable, due to the uncertainty associated to the minimum of the H^- opacity reached in this band. The variations induced by the change in metallicity or surface gravity are only important for $T_{\rm eff}$ lower than 4250 K. In particular, the variation of R-factors in the range $\log(g) = 4 - 5$ is almost negligible. For this reason, the assignation of gravity has been done in a somewhat rough fashion, which satisfies nevertheless the accuracy requeriments of this work.

3.2. $q(\lambda_{\rm IR})$ *factors*

The use of broad band photometry to obtain the IR monochromatic fluxes requires the application of the so-called q-factors introduced in Eq. (3), and defined as

$$q(\lambda_{\rm IR}) = \frac{\int_{\lambda_1}^{\lambda_2} K_{\rm cal}(\lambda,\lambda_{\rm IR})T(\lambda){\rm d}\lambda}{\int_{\lambda_1}^{\lambda_2} K(\lambda,\lambda_{\rm IR})T(\lambda){\rm d}\lambda}, \qquad (5)$$

where $T(\lambda)$ is the instrumental transmission of the photometric system, which includes the detector response, the optical system of the telescope and photometer, and the absorption of the atmosphere. The function $K(\lambda, \lambda_{\rm IR})$ is the stellar flux density normalized to the value of flux density at $\lambda_{\rm IR}$, and (λ_1, λ_2) is the bandpass of the system (see Appendix 1 in Paper II for further details). The q-factors allow to cope with the problem of deriving the flux in a specific wavelength from the filter-integrated flux in the whole photometric band. An optional approach to this problem is described in Saxner & Hammarbäck (1985).

Ideally, q-factors should be determined from spectroscopic data, considering a set of stars sampling homogeneously the domain of physical parameters in $T_{\rm eff}$, $\log(g)$ and [Fe/H]. Unfortunately the data-base of registered IR spectra is insufficient to make this approach realistic. In practice, we can rely on a grid of models to compute q factors. Tables 1-3 contain q-factors for bands J, H and K, ordered according to temperature, gravity and metallicity. The physical parameters adopted to generate the model for the calibration star (Vega) were $T_{\rm eff}$ =9610 K, $\log(g)$= 3.95, [Fe/H]=−0.25. Note that the q-factors imply secondary corrections in most of the range studied.

3.3. *Sensitivity of $q \times R$ to the effective temperature*

The separation of terms in Eq. (4) (i.e. theoretical elements in the right-handside, and observational data in the left-handside) provides a simple way of analysing the influence of errors on the derived temperatures. Tables 1-3 contain the calibration of R- and q-factors generated with Kurucz's new models as a function of temperature, metallicity and surface gravity. These relations allow to determine the errors induced by the different variables on the derived temperatures.

Figure 2 shows the error in temperature induced by a variation of 5% in factor $q \times R$ (the theoretical counterpart to the quotient $F_{\rm Bol}/F(\lambda_{\rm IR})$). As it may be appreciated, the change in temperatures derived using R_H and R_K factors is approximately constant over 4000 K: 1.5−2% for T_H and 1.5% for T_K. The change of T_J varies from 5% at 4000 K to 2% at 8000 K. Hence, R_J is the worse indicator of $T_{\rm eff}$ for the application of the IRFM, and will only be used over 5000 K.

Figure 3 shows the influence of an error of 0.5 dex in metallicity on the temperature derived applying the IRFM in the band K. Over 4200 K the average error is under 0.25%.

Figure 4 shows the influence of an error of 0.5 dex in $\log(g)$ on the temperature derived in the band K. The changes in temperature are practically negligible between 4200 K and 7500 K. Between 4000 K and 4200 K the change amounts 1−2%. Over 7500 K the change may amount −0.5%.

4. Observational inputs for the IRFM

In the following paragraphs the different observational inputs which enter the application of the IRFM will be commented. First of all, we provide a description of the sample of stars collected for this program.

4.1. *The selection of the sample*

The stars of the sample were extracted mainly from three independent photometric surveys: Sandage & Kowal (1986), Carney & Latham (1987) and Schuster & Nissen (1988). These works are involved with the study of different properties of halo field stars, and provide broad band UBV and Strömgren photometry. The selected sample of stars covers the entire range of effective temperature and metallicity observed in the main sequence of globular clusters, and intermediate and old disk clusters (i.e. late spectral types of luminosity class V and VI). The stars of the sample range practically $0.3<(B-V)<1.7$, $0.1<(b-y)<1.0$, and $0.0< \delta_{0.6}(B-V) <0.3$, which roughly implies $-3.5<$ [Fe/H] <0.5. After the measurement of IR photometry (Paper I), the stars with $(V-K)\geq 4.2$ were discarded since the practical limit in temperatures of the models is around this value (equivalent to $\sim$ 3500 K). A subsample containing dwarfs, and all the subdwarfs from the Catalogue of Spectroscopic Abundances (Cayrel de Strobel et al. 1992) with [Fe/H]$<$ 0, observable from the Teide Observatory ($66^\circ > \delta > -28^\circ$) has also been included in order to revise the published relations [Fe/H]$= f((b-y), m_1, c_1, \delta_{0.6}(U-B), (B-V)...)$. The revisions will provide good estimates of the metallicity for the remainder of the stars of the programme (see Sect. 4.5). A number of stars in the sample are in the input catalogue of the Hipparcos mission. The sample also contains a group of metal poor stars whose parallaxes have been accurately determined (Sandage 1983; Laird et al. 1987; Van Altena et al. 1988).

The dwarfs and subdwarfs from Carney (1983a, b) not common to Paper I were incorporated in order to increase the sampling of the metallicity range for types F0-K0. It is noteworthy the good quality of Carney's photometry, and also the close similarity of TCS and CIT infrared systems. The dwarfs contained in the list of calibration stars of the TCS (Kidger 1992) not measured for this programme have also been incorporated into the sample. Some stars contained in the study of M dwarfs by Legget (1992) with $(V-K)\leq 4.0$ were initially

Table 10. Comparison between the temperatures derived in the present work (Col. 2) and those derived by Blackwell & Lynas-Gray (1994) (Col. 3). The mean difference $T_{\rm IRFM} - T_{\rm BG89}$ is -31 ± 58 K

Star	T_{IRFM} (K)	T_{BL94} (K)	ΔT (%)	ΔT (K)
HR0509	5388	5316	-1.34	72
HR0219 *	5817	6044	3.90	-227
HR0937	5996	6042	0.77	-46
HR1101	5998	5977	-0.35	21
HR1325	5079	5163	1.65	-84
HR1729	5847	5947	1.71	-100
HR5447	6770	6763	-0.10	7
HR5634	6571	6617	0.70	-46
HR5986	6158	6169	0.18	-11
HR8905	5954	6050	1.61	-96

* This spectroscopic binary star has been discarded in the computation of the mean difference.

included in the sample, but their cool temperatures (3500–4000 K) are well under limit of validity of the models due to the problems associated to the computation of molecular opacities (Kurucz 1991). Finally, some bright population I stars from Saxner & Hammarbäck (1985) and Bell & Gustafsson (1989), and population II stars from Arribas & Martínez-Roger (1989), who provide temperatures obtained by applying the IRFM, have been included in the sample in order to make comparisons.

In summary, the final sample consists of nearly 500 stars. This number clearly surpasses that of the previous works devoted to the study of the scale of temperatures of low main sequence, especially those which analyse metallicity effects.

4.2. *The IR monochromatic fluxes*

The determination of monocromatic fluxes at a wavelength of the IR continuum requires, from the observational side, the measurement of IR photometry for the problem stars with respect to a standard whose absolute flux be well determined. By using the results summarised in Sects. 4.2.1 and 4.2.2, we have determined the monochromatic fluxes in λ_J, λ_H and λ_K for each star in the present sample, which are listed in Table 4.

4.2.1. The IR photometry

The programme of broad band photometry in the near IR is described in Paper I. There, the photometric system of the TCS was characterized and the transformation equations into/from different photometric systems were established. The J, H and K magnitudes were measured for 75% of the stars in the sample, with an accuracy in the order of 0.02 mag. For the remainder of the stars, the photometry was obtained from the literature (Carney 1983a, b; Legget 1992; Kidger 1992; Saxner & Hammarbäck 1985; Bell & Gustaffson 1989), after checking that these works had a similar level of accuracy.

The isolated effect of the photometric errors on the $T_{\rm eff}$ determination can be inferred from Sect. 3.3, taking into account Eq. (4).

4.2.2. The absolute calibration of the IR flux

In Paper II, a semiempirical method was devised to determine the absolute calibration of the flux of Vega in the near IR (from J to L'). This absolute calibration sets on the same scale the temperatures derived applying the IRFM with new Kurucz's models and the mean direct temperatures derived from angular diameters measurements. When compared to the results of the only so-far empirical calibration, summarised by Mountain et al. (1985, M85), a clear trend with wavelength may be appreciated (+0.2% in the band J, −1.5% in the band H and −4.5 in the band K). This point suggests that the IR fluxes for Vega by M85 are overestimated towards the longest wavelengths. However, it is worth noticing the good agreement (within 1%) with the semiempirical calibration for Vega provided by Walker & Cohen (1992), the theoretical one by Dreiling & Bell (1980) and the 'self-consistent' calibration by Blackwell et al. (1991).

The errors in the absolute IR flux calibration have different effects on the temperatures derived by mean of the IRFM, depending on the photometric band (Table 5). The errors of the absolute IR flux calibration were estimated 3% in the band J, and 4% in the bands H and K. Over 4000 K the effect of these errors is practically a shift in the zero point of the temperatures scale. Considering that the above errors correlate in the three bands, the shift in the zero point of the temperature scale would amount 1.2−1.7% over 4000 K. However if, as it is most likely, the errors in the three bands are uncorrelated, the shift of the zero point is around 0.4−0.9%. Although the indetermination of the zero point of the scale is common to all kind of methods used to derive temperatures, the method adopted in Paper II to fix the absolute calibration of the

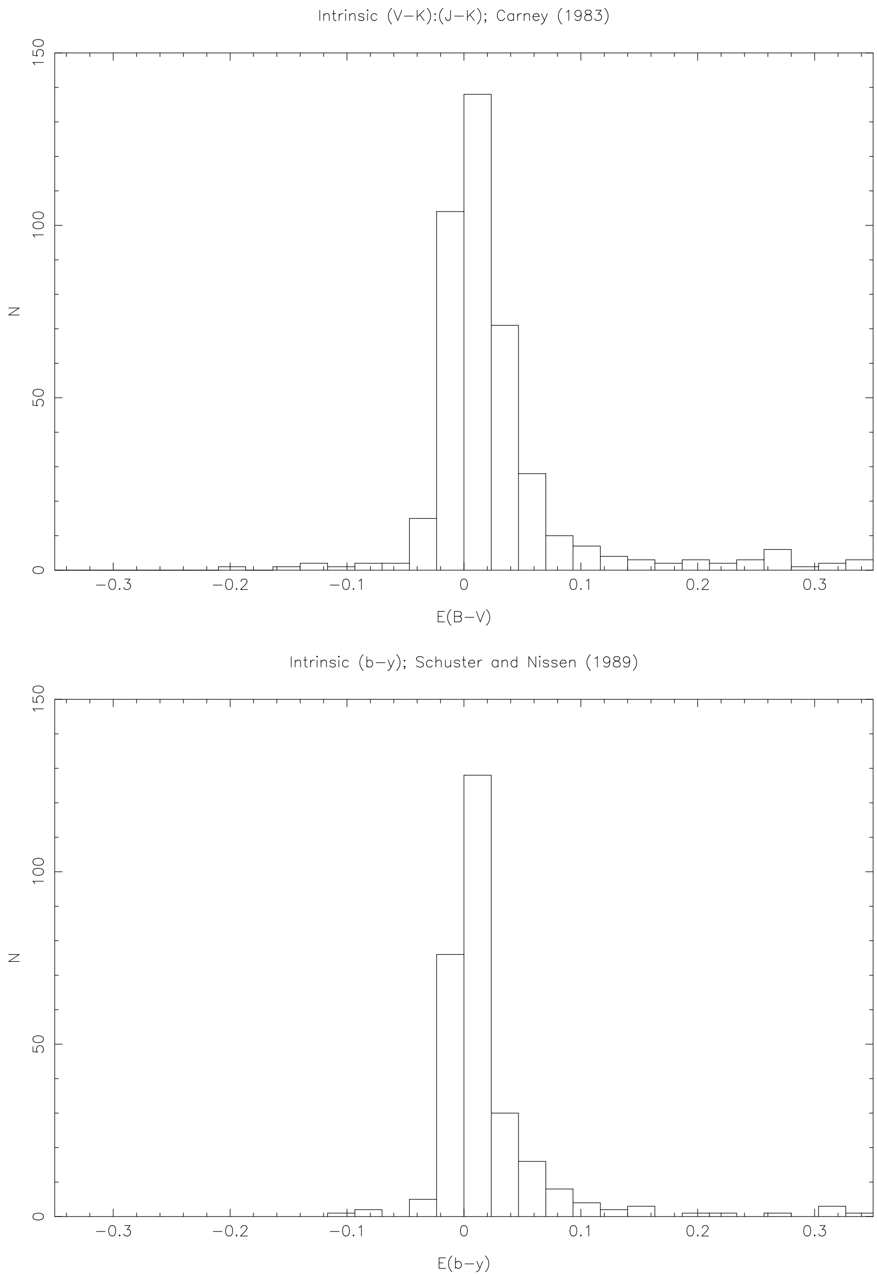

Fig. 5. Top: extinction histogram ($E(B-V)$) obtained applying to the stars of the sample the method based on the intrinsic colours $(V-K)$:$(J-K)$ (Carney 1983). Bottom: extinction histogram ($E(b-y)$) obtained applying to the stars of the sample the method based on the intrinsic relations Strömgren photometry-β index (Schuster & Nissen 1989)

flux in the near IR was designed in order to minimise this error.

4.3. *The bolometric fluxes*

For the spectral types studied in the present work, nearly all the flux arriving at the edge of the earth atmosphere passes through the atmospheric windows. Petford et al. (1988) report an accuracy of the order of 2% when comparing $F_{\rm bol}$ derived directly from calibrated spectra to $F_{\rm Bol}$ obtained integrating $UBVRI$ photometry. Therefore, the bolometric flux might be obtained from broad band photometry for each star in the sample. However, photometric calibrations of the type provided by Blackwell & Petford (1991) represent a more practical, and as accurate approach. Unfortunately, this calibrations do not include the effect of the metallicity, being only valid for Population I stars. In order to overcome this dificulty, we provided in

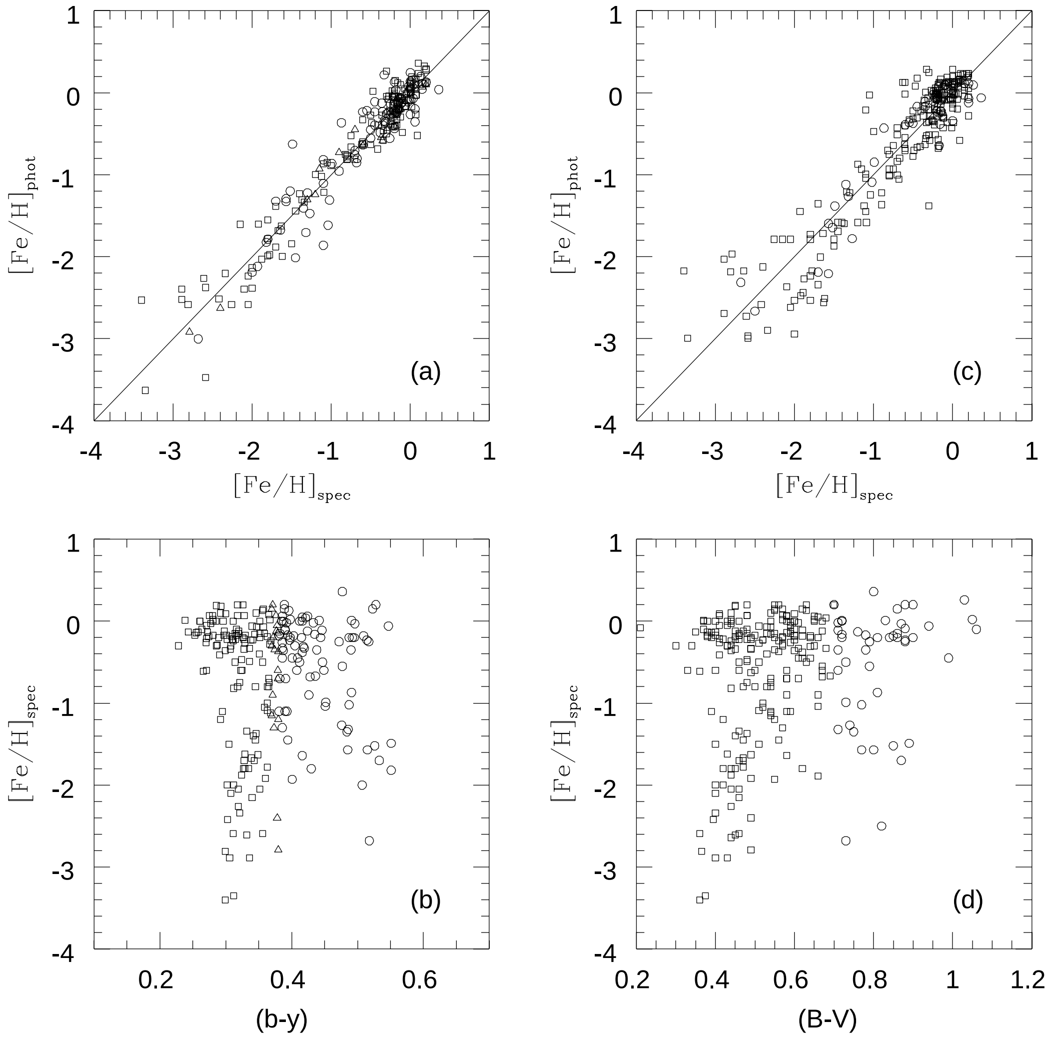

Fig. 6. a) Comparison between spectroscopic values of the metal abundance (Cayrel de Strobel et al. (1992) and Beers et al. (1991)) and values derived using the calibration by Schuster & Nissen (1989) revised according to expressions (6) and (7). Circles: calibration for F stars, squares: calibration for G stars, triangles: stars in the overlapping range of F and G calibrations. **b)** Range of colour covered by the revised calibration by Schuster & Nissen (1989). **c)** Comparison between spectroscopic values of the metal abundance (Cayrel de Strobel et al. 1992 and Beers et al. 1990) and values derived using the calibration by Carney (1979) revised according to expressions (9) and (10). Squares: $(B-V)>0.7$, circles: $(B-V)<0.7$. **d)** Range of colour covered by the revised calibration by Carney (1979)

Paper III calibrations of the bolometric flux as a function of K, $(V-K)$ and [Fe/H] for main sequence stars of spectral types F, G and K, which grant the overall level of accuracy expected for the final temperatures derived in this work. It should be noted that these calibrations are ultimately based on the optical absolute flux calibrations of Vega by Hayes & Latham (1975) and Tüg et al. (1977), and the IR absolute flux of Paper II. The bolometric fluxes assigned to the stars in the sample are listed in Table 4.

4.4. *The reddening correction*

Most of the stars in the sample should not be significantly affected by the interstellar absorption, since are distributed close in the solar neighbourhood. However, in some cases reddening corrections need to be applied. Therefore, $E(B-V)$ has been estimated for each star in the sample. When these values have been considered significant, the colours have been corrected according to the extinction law ($A_\lambda = f(A_V, \lambda)$) compiled by Landolt-Börnstein (1982c). Two independent methods

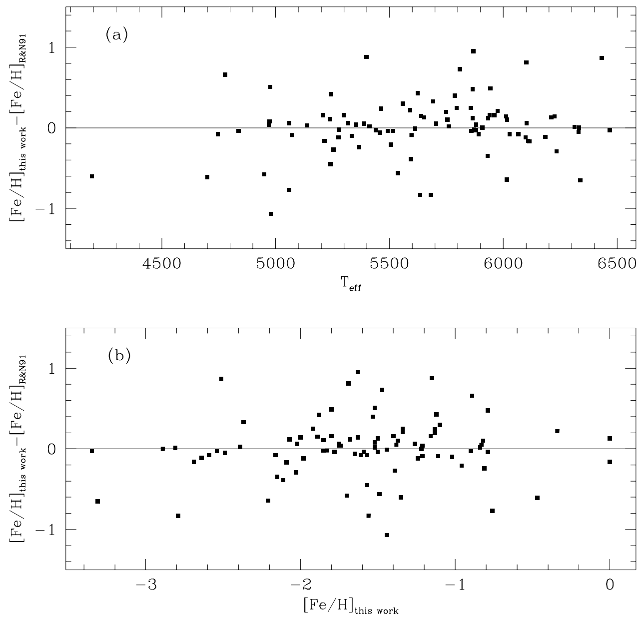

Fig. 7. a) Differences between the metallicities adopted in this work and those derived by Ryan & Norris (1991) versus effective temperature. **b)** The same that in **a)** versus metallicity. The differences show no apparent trends either with temperature or metallicity

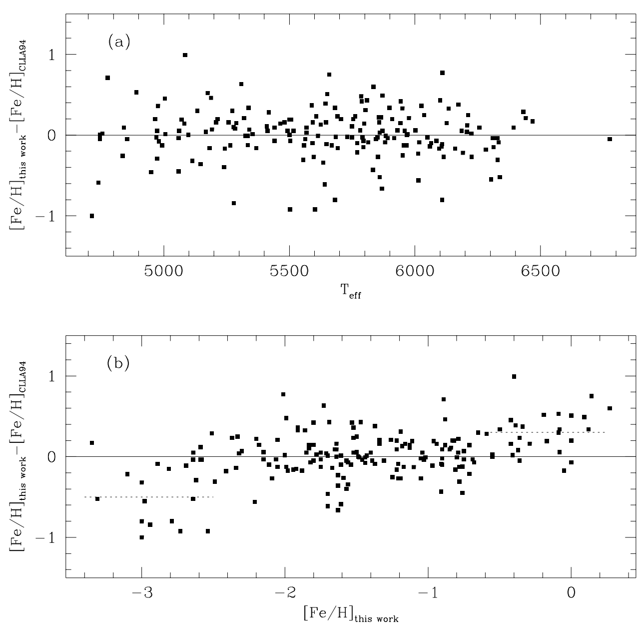

Fig. 8. a) Differences between the metallicities adopted in this work and those derived by Carney et al. (1994) versus effective temperature. **b)** The same that in **a)** versus metallicity. No trend may be appreciated with temperature. However, our [Fe/H] estimate is 0.5 dex higher for [Fe/H]<−2.5, and 0.3 dex lower for [Fe/H]>−0.5

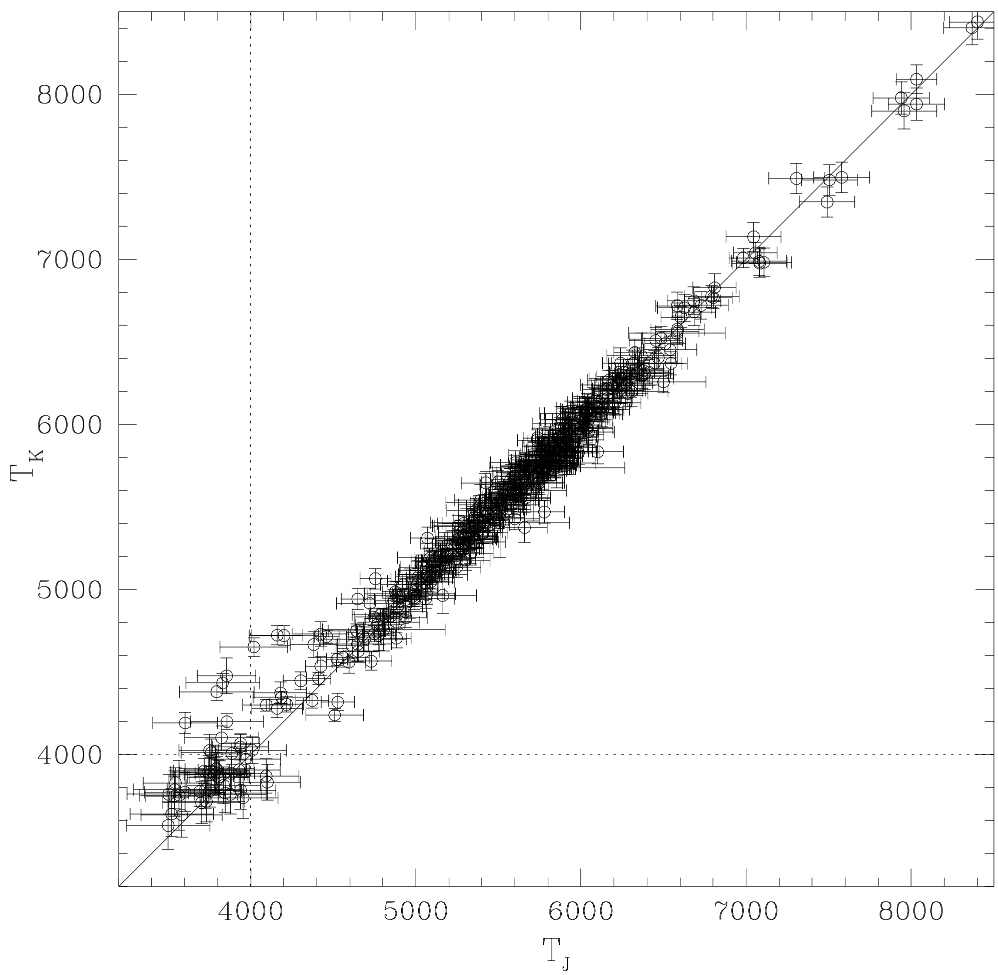

Fig. 9. Comparison between T_J and T_K. The dotted lines mark the lower limit ($T_{\rm eff}$ = 4000 K) where models begin to falter due to the lacking of molecular opacity sources. It is worth notice the progressive departure of the points from the diagonal towards the cooler stars

have been considered for determining $E(B-V)$. The first one is based on the intrinsic relation $(V-K)$:$(J-K)$ (Carney 1983a), considering E$(V-K)$=2.72 $E(B-V)$ (Savage & Mathis 1979). The histogram obtained with all the values within the application range is presented in Fig. 5. The second method is based on the β index and Strömgren photometry. Schuster & Nissen (1989) have calibrated $E(b-y)$ with an accuracy of 0.015 mag. The result of applying this calibration to the stars of the sample is showed in the histogram of Fig. 5.

Moreover a number of stars of the sample have extinction estimations determined by other authors (Laird et al. 1987; Beers et al. 1990) based on reddening maps by Burnstein & Heiles (1982). The correlation between the different methods is acceptable for $E(B-V)$<0.1 mag, over this value it worsens.

When Strömgren and β photometry was available the method by Schuster & Nissen (1989) was preferred, considering $E(B-V)$=0 for $E(b-y)$<0.025, and $E(B-V)$=1.37 $E(b-y)$ otherwise (Crawford 1975). The values taken from the literature, and those determined by means of the intrinsic relation $(V-K):(J-K)$ were considered for the remainder of the stars. Table 4 contains the reddening value assigned to each star in the sample. Note that only a relatively reduced number of stars (about 15 percent) needed reddening correction.

The first line of Table 5 shows the change in temperature induced by $E(B-V)$=0.05 mag when applying the IRFM. The effect is stronger for hot stars which emit most of their flux in the visible/UV wavelength range.

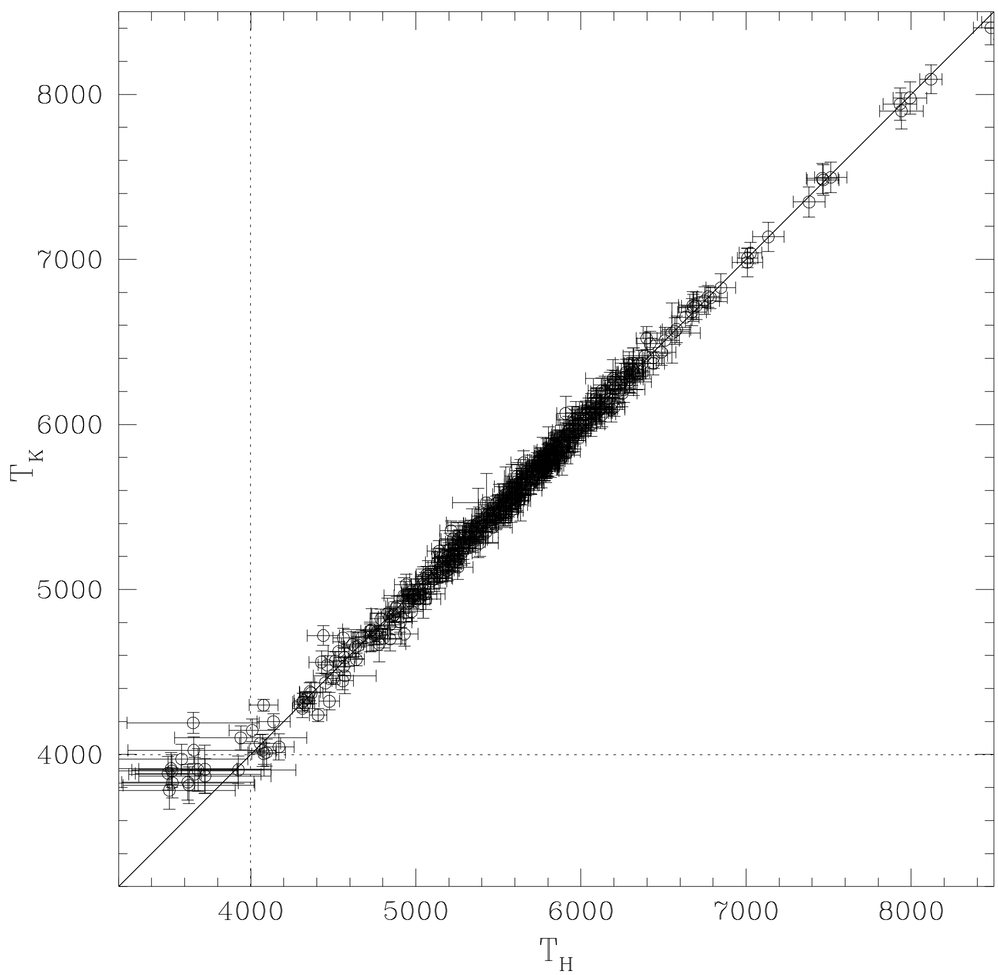

Fig. 10. The same that Fig. 9 for T_H and T_K. Notice the small dispersion around the diagonal line over 4000 K

4.5. *Metallicity and surface gravity*

The effective temperature determination by means of Eq. (4) requires an estimation of the star metallicity and surface gravity. These parameters, however, need not to be very accurate as commented in Sect. 3.3. In particular, it may be concluded that 0.5 dex and 0.3 dex uncertainties in $\log(g)$ and [Fe/H], respectively, are sufficient to obtain temperatures within an accuracy of 2% (see Table 6). Therefore, regarding the surface gravity, it is enough to consider an average surface gravity $\log(g)$=4.5 for the subdwarfs. However, taking into account the effect of $T_{\rm eff}$ on the stellar radius, we have preferred to assign $\log(g) = 5$ for the cooler stars, and $\log(g)$=4 for hotest population I stars. These values are compatible with those provided in the reviews by Popper (1980) and Andersen (1991) for dettached binary systems formed by main sequence stars. The gravities adopted for the stars of the sample are listed in Col. 2 of Table 4.

Unfortunately, only a limited number of stars in the sample had their metal abundance determined from fine spectroscopic analysis included in the Catalogue of [Fe/H] determinations by Cayrel de Strobel et al. (1992). Therefore for the remainder of stars, photometric metallicity calibrations based on $\delta_{0.6}(U-B)$ index (Carney 1979), and on Strömgren photometry (Schuster & Nissen 1989), were adopted.

Instead of apply directly these calibrations, we have checked their validity and accuracy. For this purpose, 252 dwarfs and subdwarfs from Cayrel de Strobel et al. (1992) were considered. For each star we assign an averaged abundance giving preference in the weights to recent data based on solid state detectors. We also included, in that group for checking the photometric calibrations, 45 dwarfs from Beers et al. (1990) common to our sample. We have found slight differences between the photometric calibrations and the spectroscopic values which are

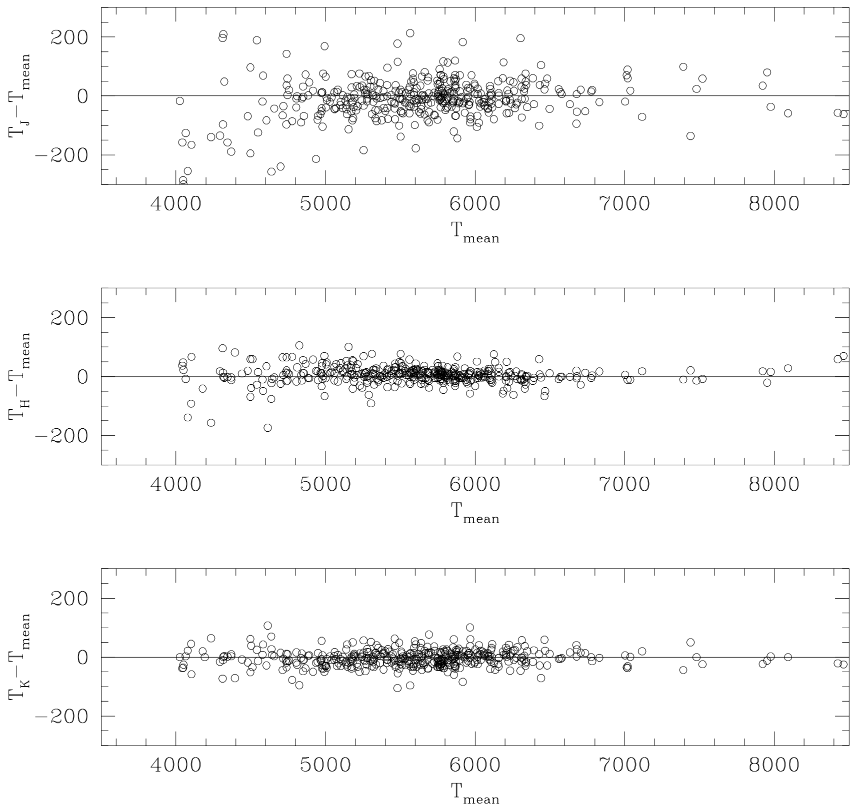

Fig. 11. Differences $T_J - T_{\rm mean}$ (top), $T_H - T_{\rm mean}$ (center) and $T_K - T_{\rm mean}$ (bottom) versus effective temperature adopted. No apparent trend may be appreciated

commented below.

(a) Strömgren photometry calibration.(Schuster & Nissen 1989): 238 stars with spectroscopic determination of the abundance are within the ranges of the calibrations by Schuster & Nissen (1989). The following corrections were applied:

$$[{\rm Fe/H}]^{\rm F}_{\rm phot} = 0.82[{\rm Fe/H}]_{\rm spec} - 0.08,\ \sigma = 0.18, {\rm dex}\ n = 150, \quad (6)$$

$$[{\rm Fe/H}]^{\rm G}_{\rm phot} = 0.93[{\rm Fe/H}]_{\rm spec} - 0.01,\ \sigma = 0.21, {\rm dex}\ n = 105, \quad (7)$$

where the superindex refers to the calibration of type F and G stars. The zero correction is practically negligible, whereas the correction of the slope may imply differences of 0.3−0.5 dex. If we consider both calibrations altogether, the correction should be:

$$[{\rm Fe/H}]_{\rm phot} = 0.85[{\rm Fe/H}]_{\rm spec} - 0.04,\ \sigma = 0.22, {\rm dex}\ n = 238. \quad (8)$$

This result agrees with the conclusion by Schuster & Nissen (1989) that their calibrations should perhaps require a slight correction to adjust the revised spectroscopic values (they propose a multiplicative factor of correction for their calibration of 1.15 which roughly coincides with our correction).

(b) Broad band photometry: $\delta_{0.6}(U-B)$ (Carney 1979): 259 stars with spectroscopic determinations are within the range of the calibration of $\delta_{0.6}(U-B)$ index by Carney (1979). This calibration has been extended to the limit permitted by the deblanketing vectors provided by Sandage (1969). Correction differs according to colour.

$$[{\rm Fe/H}]_{\rm phot} = 0.83[{\rm Fe/H}]_{\rm spec} - 0.02,\ \ \sigma = 0.28\,{\rm dex}, \quad (9)$$
$$n = 212,\ \ (0.35 < (B-V) \leq 0.7),$$

$$[{\rm Fe/H}]_{\rm phot} = 1.03[{\rm Fe/H}]_{\rm spec} + 0.10,\ \ \sigma = 0.25\,{\rm dex}, \quad (10)$$
$$n = 48,\ \ (0.7 \geq (B-V) < 1.1),$$

Figure 6 shows the comparison, after corrections, between the spectroscopic and photometric values of the abundance, and the ranges of colour and metallicity covered. Notice the loss of sensitivity, with increasing

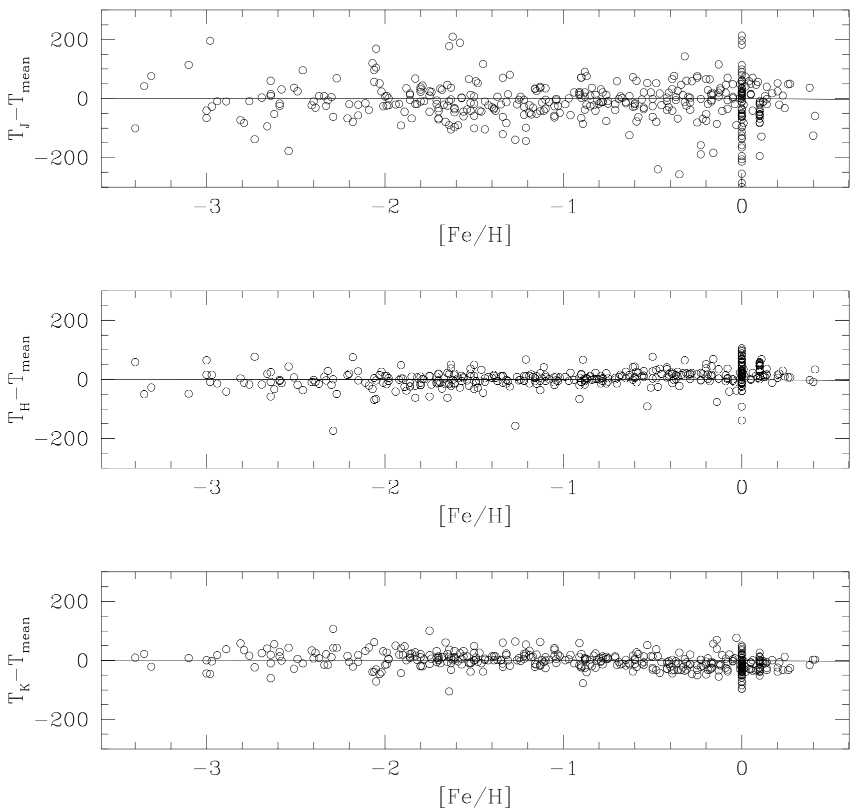

Fig. 12. The same that Fig. 11 versus [Fe/H]

metallicity, in both calibrations.

In summary, the metallicity has been assigned in a twofold way: Firstly, spectroscopic determined [Fe/H] (Cayrel de Strobel et al. 1992), with a mean accuracy within 0.15 dex, have been preferred. Secondly, the revised calibrations by Schuster & Nissen (1989) (accuracy within 0.2 dex) and Carney (1979) (accuracy within 0.3 dex) were applied to the stars lacking fine spectroscopic analysis.

For the M stars extracted from the compilation by Legget (1992), metallicity has been assigned according to their kinematical classification (i.e. [Fe/H]=0 for young disk stars, [Fe/H]=−1 for young disk to old disk transition stars, and [Fe/H]=−1.5 for old disk stars).

The assigned metallicities are listed in Col. 3 of Table 4.

4.5.1. Comparison to other determinations

Our work share 92 and 186 stars in common with the extensive surveys of Ryan & Norris (1991; R&N91) and Carney et al. (1994; CLLA94) respectively. Both works provide a good basis to check the scale of metallicity adopted here.

In Fig. 7, we compare our [Fe/H] estimates to the abundances derived by R&N91 based on a calibration of the Ca II H and K line absorption. The mean difference $[Fe/H]_{\rm This\,work}-[Fe/H]_{\rm R\&N91}$ is 0.01 dex with $\sigma = 0.37$ dex. The scatter of the differences is compatible with the internal errors of both works. No trend of the differences may be appreciated either with temperature (Fig. 7a) or with metallicity (Fig. 7b).

The comparison of the abundances adopted by us with those derived by CLLA94, based on the cross correlation of high resolution low S/N spectra with model templates, shows a fairly good agreement in the range from [Fe/H]=−2.5 to [Fe/H]=−0.75. However, noteworthy differences appear for $[Fe/H]< -2.5$ and $[Fe/H]> -0.5$. The overall mean difference $[Fe/H]_{\rm This\,work}-[Fe/H]_{\rm CLLA94}$ is 0.01 dex with $\sigma = 0.31$ dex. No trend with temperature may be appreciated in the differences (Fig. 8a), however there exists a clear correlation with metallicity (Fig. 8b).

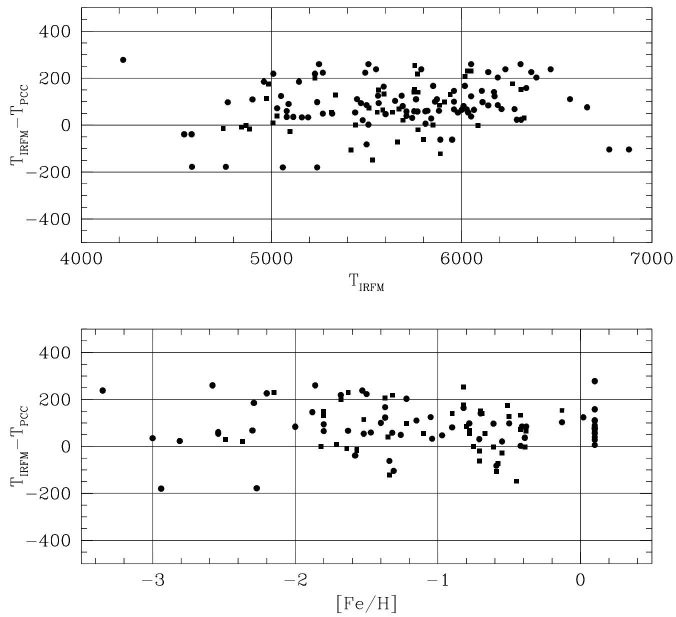

Fig. 13. Differences between the temperatures derived in this work ($T_{\rm IRFM}$) and those derived by Peterson & Carney (1979; Squares), and Carney (1983; Circles). $T_{\rm PCC}$ are, in average, 100 K cooler than those derived in the present work. There exists a slight trend with temperature. The differences have a slight slope amounting approximately 100 K between the extreme points of the overlaping range

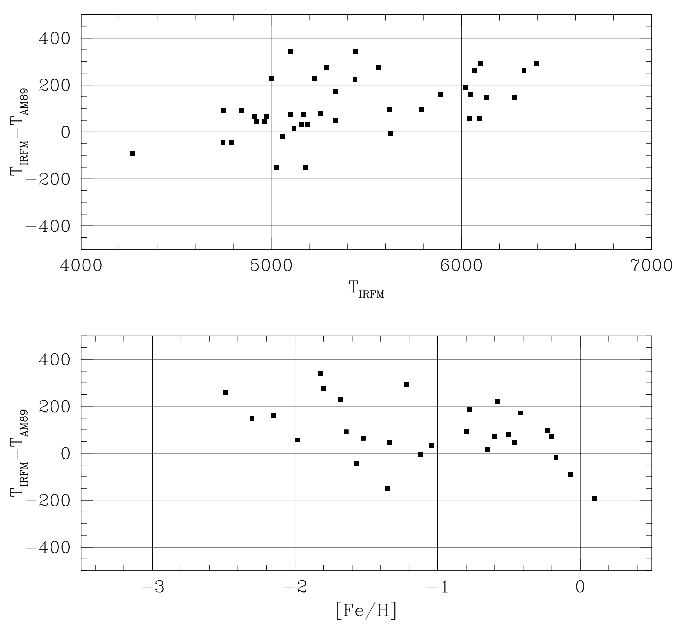

Fig. 14. Differences between the temperatures derived in this work ($T_{\rm IRFM}$) and those derived by Arribas & Martínez-Roger (1989). $T_{\rm AM89}$ are, in average, 150 K cooler than those derived in the present work. There exist clear trends with temperature and metallicity. The differences may be explained taking into account the different models and absolute flux calibration of the IR flux adopted in both work

On the one hand, our [Fe/H] estimate for the most metal defficient stars ([Fe/H]< -2.5) is 0.5 dex higher in average than [Fe/H]$_{\rm CLLA94}$, which implies a difference of $\pm 0.2\%$ in the temperature derived using the IRFM. On the other, our [Fe/H] estimate for stars with [Fe/H]> -0.5 is 0.3 dex lower in average, which implies a difference of $\pm 0.4\%$ in temperatures derived using the IRFM.

5. The temperatures determination

According to the procedure described in previous sections, we have derived three effective temperatures for each sample star by applying the IRFM in the IR wavelengths considered (Eq. 4). The individual values T_J, T_H and T_K, with their errors are listed in Table 4.

Figures 9 and 10 present the comparison between the temperatures obtained in the three different bands taking T_K as a reference. The individual errorbars allow to appreciate that the dispersion is compatible with the estimated errors derived from the uncertainties in the input parameters of the IRFM. As expected, the uncertainties are greater for temperatures obtained from R_J factors, due to the lesser sensitivity of the IRFM in this band, and the greater photometric error in the measurement of J. The consistency of T_J, T_H and T_K is good over 4000 K, however under this temperature there exist noteworthy discrepancies due to the fact that R_J- and R_H-factors lose their sensitivity to temperature in this range.

The final temperature was derived as the mean of T_J, T_H and T_K weighted with the inverse of their errors:

$$\overline{T_{\rm IRFM}} = \frac{\frac{T_J}{(\Delta T_J)} + \frac{T_H}{(\Delta T_H)} + \frac{T_K}{(\Delta T_K)}}{[\frac{1}{\Delta T_J} + \frac{1}{\Delta T_H} + \frac{1}{\Delta T_K}]}. \quad (11)$$

In order to estimate the error of the mean temperature, a linear transmission of the errors was considered, given that the errors in each band are not totally independent:

$$\Delta T_{\rm IRFM} = \frac{3}{[\frac{1}{\Delta T_J} + \frac{1}{\Delta T_H} + \frac{1}{\Delta T_K}]}, \quad (12)$$

where the error in the temperature of each band is defined by

$$(\Delta T_i)^2 = [\frac{\Delta T_i}{\Delta[q(\lambda_i)R(\lambda_i)]}]^2(\Delta[q(\lambda_i)R(\lambda_i)])^2 + [\frac{\Delta T_i}{\Delta[{\rm Fe/H}]}]^2\ (\Delta[{\rm Fe/H}])^2 + [\frac{\Delta T_i}{\Delta \log(g)}]^2\ (\Delta \log(g))^2 \quad (13)$$

.

Over 5000 K, the temperatures in the three bands enter the average with similar weight. In that range, the assignation of weights automatically takes into account the unlike sensitivity of the IRFM in the different bands and the individual quality of IR photometry. However, under 5000 K only T_H and T_K has been considered in the average, since R_J is a very insensitive indicator of temperature for the cooler stars. Under 4000 K, only T_K has been considered. This is due to the fact that the coolest models show in the band H a local maximun of flux which is not observed in IR spectra (Lançon & Rocca-Volmerange 1992). The mean error in the final temperatures is around 1$-$2%. Notice however, that the uncertainties in the temperatures derived under 4000 K are greater than the errors determined from Eq. (12) due to the dificulties of models in this range caused by the absence of important sources of opacity associated to some molecules. Likewise, the IRFM is difficult to apply at temperatures over 8000 K (five stars of the sample have such high temperatures) because as these stars emit a substantial proportion of energy at short wavelengths, the correction for insterstellar extinction and the determination of the bolometric flux are rather uncertain. For these reasons, the temperatures outside the range 4000 K$<T_{\rm eff}<$8000 K have a lower level of accuracy (perhaps a most adequated estimation is the duplication of the size of the errorbars quoted in Table 4 for these temperatures).

We show in Figs. 11 and 12 the differences of T_J, T_H and T_K from the mean temperature adopted. Over 4000 K they follow approximately a normal distribution both with effective temperature and metallicity.

6. Comparison with other determinations

In this section, we provide the comparison of our temperatures with those derived by other authors for common stars of the sample. Furthermore a detailed analysis of the scale of temperatures derived from the present work will be done in a subsequent paper by considering the mean relations $T_{\rm eff}$:[Fe/H] and photometric colours $UBVRIJHK$ and $uvby$-β.

The Sun and Procyon, the only dwarfs later than F5 whose diameters has been measured by optical methods, are included in the sample. The agreement between their IRFM temperatures and the direct ones is excellent. In fact, the IRFM provides 6579 K for Procyon, close to the direct temperature (6510 K) obtained considering its angular diameter (Hanbury-Brown et al. 1974; Mozurkewich et al. 1991) and its bolometric flux (Code et al. 1976). Regarding the Sun, the value derived from the IRFM determination is 5763 K. This good agreement is a consequence of the procedure followed for scaling the effective temperatures obtained from the IRFM, since the absolute calibration in the near IR was established on the basis of empirical diameters measurements. In addition, it is worthy to notice that the mean temperatures of solar analogue stars (espectral types G0/2V, [Fe/H]~ 0, $(B-V)\sim$

0.63) is close to the solar value (5743±100 K vs. 5780 K for the Sun), and the same for stars of types F3/5V, [Fe/H]~ -0.05, $(B-V)\sim 0.43$ similar in their features to Procyon (6578±150 K vs. 6510 K).

The works by Peterson & Carney (1979), and Carney (1983a) (hereafter PCC), based on spectrophotometric analysis, contain respectively 43 and 64 stars common to our sample whose range of temperatures and metallicities is similar to that analysed in the present programme. Figure 13 shows the difference $T_{\rm IRFM}-T_{\rm PCC}$ versus temperature and metallicity. PCC temperatures are, in average, 100 K cooler than those derived in the present work. No significant trend of the differences with metallicity may be appreciated. However there could exist a slight slope along the axis of temperatures amounting approximately 100 K between the extreme points of the overlaping range. This difference is compatible with the uncertainty of the zero point. The different models considered might also explain the observed discrepancies.

There are 18 stars common to the work by Saxner & Hammarbäck (1985, SH85) devoted to F stars and based on the application of the IRFM. The good agreement is noteworthy as can be appreciated from Table 7. The differences are compatible with the errors of both works, and the average residuals only amount 5±63 K ($T_{\rm SH85}$ are cooler).

The work by Magain (1987) based on the IRFM presents 11 stars in the metallicity range (−1, −3). The mean difference $T_{\rm IRFM}-T_{\rm M87}$ is 112±56 K (Table 8) which implies a shift of 1.9% in the zero point of the temperature scale. This work adopts the IR absolute flux calibration provided by SH85 which is very close to ours (+0.3% in J and +1.8% in K), so the differences of the models considered in each work should account for the shift of the zero.

There are 28 stars common to the work by Arribas y Martínez-Roger (1989, AM89), based on the application of the IRFM using the empirical absolute flux calibration of the IR flux of Vega derived by Mountain et al. (1985), and models by Kurucz (1979) and Gustaffson et al. (1975). The systematic differences found both with temperature and metallicity (Fig. 14) may be explained taking into account that the models used in the present work include new oppacities, and also to the problems of the IR absolute flux calibration derived by Mountain el al. (1985) as described in Paper II.

Bell & Gustafsson (1989, BG89) present 13 dwarfs common to the present sample. BG89 temperatures are based on the IRFM corrected using IR synthetic colours. Over 4500 K the differences listed in Table 9 are compatible with a zero point shift of 56 K ($T_{\rm BB89}$ are hotter). For the coolest stars, where models loses reliability, differences are stronger. The discrepancies are explained taking into account the differences in the bolometric fluxes considered in both works (see Paper III).

Blackwell & Lynas-Gray (1994, BLG94) have recently applied the IRFM using the new Kurucz's models to a sample of Population I stars. Although only 11 dwarfs are common to the present sample and consequently possible systematic differences are difficult to ascertain, that work is a good source for comparison, given that the main difference respect to the present work is the IR absolute flux calibration. BLG94 adopt the theoretical calibration of the IR flux of Vega provided by Dreiling & Bell (1980), which differ less than 1% in all the bands from that adopted here. Table 10 shows the differences. In average, $T_{\rm BLG94}$ are 31 K hotter than ours (the spectroscopic binary HR 219 has been discarded in the mean), this shift in temperature ($\sim 0.6\%$) is compatible with the slight difference in the bolometric fluxes (around 1.5%), as analysed in Paper III.

7. Summary

The IRFM has been applied to a sample of approximately 500 main sequence stars later that F0, which cover the metallicity range (0.5, −3.5). Near IR monochromatic fluxes have been used in order to derive T_J, T_H and T_K for each star. The uncertainties of the input parameters needed to apply the IRFM and the induced errors on the three temperatures derived have been computed. The consistency of the temperatures derived in the three different bands is fairly good over 4000 K. The final temperature for each star in the sample has been derived considering the mean of T_J, T_H and T_K weighted with the inverse of their errors. From the analysis of the systematical errors associated to the uncertainty of the absolute flux calibration in the near IR, the expected indetermination of the zero point of the scale of temperatures should be around 1%. However the good agreement between the IRFM and direct temperatures for the Sun and Procyon suggests a lower uncertainty. The mean estimated precision for the final temperatures, considering the effect of both systematical and accidental errors, is around 1.5%. The comparison with other works shows slight discrepancies which may be explained considering the differences induced by the improvements adopted in the application of the IRFM: The new atmosphere models, the absolute IR flux calibration and the determination of the bolometric fluxes.

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Table 4. The input parameters needed to the application of the IRFM for each star of the sample. Column 1: Identification, the Giclas number has been preferred when available HD, BD, HR and GJ numbers were used otherwise. The stars are ordered in right ascension. Column 2: Surface gravity. Column 3: Metallicity. Column 4: Bolometric flux in (erg cm^{-2} s^{-1}). Column 5: Interstellar redenning. Column 6: Monochromatic flux in the band J in (10^2 erg cm^{-2} s^{-1} nm^{-1}). Column 7: q-factor in the band J. Column 8: Temperature derived in the band J (units are K). Column 9: Error in T_J computed considering errors in $F_{\rm Bol}$, F_J, $\log(g)$ and [Fe/H]. Columns 10-13: The same that Cols. 6-9 for the band H. Columns 14-17: The same that Cols. 6-9 for the band K. Column 18: The weighted mean temperature derived from T_J, T_H and T_K. Temperatures in brackets have not been considered in the mean as explained in Sect. 5. Column 19: Mean error computed considering linear transmission of errors from Cols. 9, 13 and 17. Temperatures under 4000 K are given in parentheses without estimation of the total error because of the uncertainties of the model fluxes in this range

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
Sun	4.44	0.00	1.359e+04	0.00	4.252e+02	1.011	5702	153	2.293e+02	1.019	5786	79	8.310e+01	1.016	5742	71	5730	90
HD225033	4.00	0.00	2.121e-10	0.00	4.084e-12	1.011	7046	166	1.097e-12	1.006	7135	94	7.152e-13	1.006	7137	66	7117	107
G171-039	5.00	0.00	1.110e-10	0.00	6.974e-12	1.012	[3738]	166	4.283e-12	1.064	[3733]	300	1.567e-12	1.034	3911	147	(3611)	—
HD1180	4.00	0.00	3.342e-10	0.00	4.498e-12	1.002	8366	171	1.329e-12	0.997	8444	106	5.709e-13	0.995	8104	103	8425	120
HR66	4.00	0.00	1.418e-09	0.00	1.020e-10		<3500		5.399e-11	1.073	4039	129	2.309e-11	1.035	4146	66	4161	91
HR72	4.00	0.20	7.077e-10	0.00	2.259e-11	1.014	5785	156	1.215e-11	1.020	5889	78	4.707e-12	1.018	5845	70	5843	89
G030-053	4.50	-0.85	3.555e-11	0.00	1.057e-12	1.010	5794	154	5.874e-13	1.021	5734	73	2.172e-13	1.018	5771	71	5784	90
G031-041	4.50	-0.51	7.813e-11	0.00	2.277e-12	1.013	5646	124	1.252e-12	1.021	5914	79	4.591e-13	1.017	5849	72	5884	87
G171-047	5.00	-1.50	6.357e-10	0.00	3.451e-11		<3500	--	2.822e-11	--	<3500	—	1.371e-11	1.027	3721	125	(3721)	—
G130-035	4.50	-2.18	6.481e-12	0.00	1.712e-13	1.008	6047	94	8.589e-14	1.017	6252	83	3.239e-14	1.017	6135	57	6126	65
HR159	4.00	-0.18	1.727e-09	0.00	6.690e-11	1.017	5071	102	2.675e-11	1.028	5224	74	1.354e-11	1.023	5312	66	5255	79
HD3567	4.50	-1.24	5.622e-11	0.00	1.660e-12	1.005	5787	88	8.780e-13	1.021	5806	82	3.151e-13	1.017	5815	50	5858	82
G001-009	4.00	0.00	3.148e-10	0.00	1.079e-11	1.014	5655	91	5.000e-12	1.021	5868	71	2.088e-12	1.018	5672	64	5657	75
BD +71 31	4.50	-1.81	2.249e-11	0.00	6.192e-13	1.008	5935	155	3.315e-13	1.013	6050	82	1.168e-13	1.017	6057	75	6026	54
HD4307	4.00	-0.19	2.303e-10	0.00	2.931e-11	1.019	5750	153	1.587e-11	1.022	5788	73	6.017e-12	1.018	5718	71	5753	90
G084-039	5.00	-1.85	2.936e-11	0.08	1.554e-12	1.071	[3833]	195	3.164e-12	1.251	[3652]	300	4.026e-13	1.024	4192	53	4192	—
HR219	4.50	0.00	1.136e-08	0.00	3.365e-10	1.013	5930	155	—	—	—	--	7.120e-11	1.036	5700	71	5817	97
G218-017	5.00	0.00	3.553e-11	0.00	2.135e-12	--	<3500		1.830e-12		<3500	·	6.385e-13	1.033	3783	92	(3783)	·
G268-033	5.00	-1.50	1.432e-10	0.00	7.115e-12	1.031	[3743]	111	6.236e-12	—	<3500	—	2.194e-13	1.025	3892	101	(3892)	—
G245-050	5.00	0.00	8.718e-11	0.00	3.479e-12	1.011	[3838]	173	2.079e-12	1.054	4372	81	1.076e-12	1.035	4046	75	4104	56
G243-052	5.00	0.00	2.313e-10	0.00	9.180e-12	1.012	[3508]	171	7.127e-12	1.056	4408	53	2.851e-12	1.052	4289	45	4312	46
HR321	4.00	-0.67	2.533e-09	0.00	8.301e-11	1.011	5317	88	5.270e-11	1.025	5526	84	1.977e-11	1.020	5504	79	5515	62
G245-033	4.00	-1.71	2.625e-10	0.00	9.935e-12	1.009	5332	133	6.042e-12	1.031	5018	70	2.022e-12	1.020	5002	82	5338	79
BS501[1]	4.50	-1.71	2.435e-12	0.00	—	—	—	—	4.603e-14	1.026	5439	78	1.735e-14	1.019	5459	67	5449	80
G268-138	4.00	-0.28	2.979e-11	0.00	8.988e-13	1.012	5844	152	4.785e-13	1.023	5606	76	1.822e-13	1.018	5559	68	5585	87
HD9137	4.00	0.00	1.338e-09	0.00	3.425e-11	1.014	5535	150	1.561e-11	1.024	5489	75	7.429e-12	1.020	5458	67	5460	86
HR458	4.00	0.00	3.331e-09	0.00	1.312e-10	1.015	6205	158	—	—	—	—	3.163e-11	1.013	6183	76	6155	102
HR483	4.50	-0.11	2.788e-09	0.00	8.577e-11	1.015	5832	155	—	--	—	--	1.685e-11	1.012	5892	72	5874	99
HR490	4.00	-0.20	2.425e-09	0.00	5.235e-11	1.016	5119	112	5.478e-11	1.031	5210	72	2.067e-11	1.021	5168	84	5172	78
HR509	4.00	-0.30	1.183e-08	0.00	2.991e-10	1.017	5125	116	2.019e-10	1.027	5425	71	8.927e-11	1.019	5346	66	5388	67
G245-032	4.50	-2.54	2.594e-11	0.00	8.061e-13	1.008	5425	149	4.188e-13	1.025	5647	77	1.572e-13	1.019	5640	70	5600	38
G100-015	4.50	-1.15	5.212e-12	0.04	1.895e-13	1.009	5754	127	9.065e-14	1.027	5815	79	3.675e-14	1.018	5819	72	5802	57
G072-060	4.50	-1.22	1.183e-11	0.00	6.752e-13	1.009	5538	152	3.674e-13	1.023	5705	75	1.362e-13	1.018	5708	70	5683	89
HR624	4.00	0.00	7.212e-10	0.00	1.811e-11	1.012	6140	161	9.271e-12	1.012	6371	85	2.405e-12	1.012	6370	79	6296	98
G074-005	4.50	-1.05	5.765e-11	0.00	2.712e-12	1.010	5659	140	1.507e-12	1.023	5675	108	5.524e-13	1.018	5700	[illegible]	5685	85
HD10133	4.00	-0.38	4.458e-11	0.00	1.415e-11	1.012	5562	152	8.242e-12	1.024	5583	76	3.040e-12	1.018	5555	69	5565	55
G004-028	4.50	-0.91	1.529e-11	0.00	4.711e-13	1.010	5931	123	1.565e-13	1.021	5920	79	6.093e-14	1.018	5798	72	5814	37
G159-050	4.50	-0.82	6.544e-11	0.00	1.672e-12	1.010	5767	133	1.083e-12	1.021	5776	70	4.033e-13	1.019	5727	77	[illegible]	92
G074-010	4.50	-1.94	3.871e-12	0.10	1.279e-13	1.308	5163	111	5.306e-14	1.020	5141	71	2.028e-14	1.020	5282	65	5182	78
G244-059	4.00	-0.55	1.255e-10	0.00	4.472e-12	1.011	5522	150	2.587e-12	1.025	5509	75	8.855e-13	1.019	5185	68	5501	98
HR0660	4.00	-0.38	7.155e-11	0.00	1.034e-10	1.012	5608	94	5.764e-11	1.023	5812	67	2.154e-11	1.018	5568	52	5591	87
BD -17 484	4.50	-2.08	1.829e-11	0.01	1.759e-12	1.009	6285	120	2.523e-13	1.017	6249	90	5.942e-14	1.015	6188	82	6234	55
HR753	4.50	-0.06	1.384e-08	0.00	7.862e-11	1.010	[4683]	104	4.969e-11	1.044	4723	91	1.951e-11	1.027	4715	90	4718	88
HD16031	4.00	-2.09	2.508e-11	0.00	9.235e-12	1.009	6076	126	1.877e-13	1.020	6093	55	1.714e-12	1.017	6155	55	6114	72
G073-057	4.50	-0.41	4.382e-11	0.00	1.792e-12	1.012	[4776]	87	1.222e-12	1.042	4784	68	4.924e-13	1.025	4744	118	4756	85
G075-031	4.50	-1.32	1.706e-11	0.00	5.133e-13	1.009	5737	122	2.589e-13	1.020	5943	51	9.693e-14	1.017	5835	73	5881	88
G075-074	5.00	0.00	7.776e-11	0.00	3.815e-12	1.011	[4760]	174	2.991e-12	1.050	4313	61	1.105e-12	1.021	4279	56	4296	58
G076-021	4.50	-2.35	2.403e-11	0.00	6.878e-13	1.008	5974	124	3.328e-13	1.020	5959	55	1.301e-12	1.018	5827	113	5931	85
G004-025	4.50	-1.89	8.267e-12	0.05	2.149e-13	1.009	6104	126	1.183e-13	1.018	6089	62	4.272e-14	1.017	6093	75	6100	90
G004-027	4.50	-3.31	1.206e-11	0.07	2.662e-12	1.008	6413	129	1.368e-13	1.016	6313	84	4.839e-14	1.018	6719	78	6567	92
G036-058[2]	4.50	-2.00	5.959e-12	0.05	—	—	—	—	8.351e-14	1.026	5493	77	3.715e-14	1.015	5445	45	5467	82
HR937	4.00	0.02	6.274e-09	0.00	1.824e-10	1.013	6037	157					3.589e-11	1.014	5975	74	5996	101
HD19445	4.25	-2.13	1.722e-10	0.00	4.380e-12	1.008	6029	100	2.448e-12	1.020	6017	141	8.928e-12	1.017	6082	90	6050	103
G076-069	4.50	-0.63	4.068e-11	0.00	1.860e-12	1.011	[4425]	90	1.280e-12	1.048	4581	64	4.936e-13	1.026	4575	56	4549	60
G037-037	4.50	-2.98	4.844e-12	0.10	1.103e-13	1.008	6500	258	8.134e-14	1.016	6229	130	3.287e-14	1.016	6259	66	6504	112
G005-035	4.50	-1.70	1.487e-11	0.00	4.438e-13	1.009	5606	124	2.492e-13	1.024	5551	73	9.156e-14	1.015	5641	77	5641	81
G005-036	4.50	-1.66	1.887e-11	0.08	4.084e-13	1.008	5989	166	2.492e-13	1.020	5952	91	8.858e-14	1.017	6029	80	5968	130
G038-001	5.00	0.00	2.008e-11	0.00	1.131e-12	1.012	[3751]	186	8.507e-13	1.066	4079	51	3.346e-13	1.027	4025	97	4037	88
G077-051	4.50	-0.75	1.268e-10	0.00	4.099e-12	1.011	5582	95	2.564e-12	1.024	5582	71	9.452e-13	1.018	5581	74	5563	65
G246-038	4.50	-2.94	2.423e-11	0.00	1.158e-12	1.008	6270	136	8.741e-13	1.025	5285	70	2.548e-13	1.030	5297	66	5279	81

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G079-042	4.50	-1.56	1.413e-11	0.00	4.420e-13	1.009	5574	121	2.427e-13	1.024	5638	77	8.922e-14	1.019	5666	70	5634	84
HR1084	4.50	0.05	1.003e-08	0.00	3.885e-10	1.014	5090	142	—	—	—	—	9.178e-11	1.023	5046	62	5076	86
HR1101	4.00	-0.12	5.186e-09	0.00	1.476e-10	1.013	6033	157	—	—	—	—	2.914e-11	1.015	5981	74	5998	101
HD22502	4.50	0.00	5.979e-11	0.00	4.432e-12	—	<3500	—	2.058e-12	1.054	4464	57	7.310e-13	1.029	4542	56	4503	56
G080-015	4.00	-0.71	5.898e-10	0.00	1.776e-11	1.011	5779	123	9.657e-12	1.021	5798	79	3.547e-12	1.017	5808	72	5798	87
G006-034	5.00	0.00	1.081e-10	0.00	6.158e-12	1.012	[3566]	238	5.516e-12	—	<3500	—	1.965e-12	1.035	3753	211	(3753)	—
HD24289	4.50	-2.07	3.502e-11	0.05	9.459e-13	1.008	5986	125	5.448e-13	1.022	5834	79	2.030e-13	1.018	5827	72	5866	87
HD25329	4.50	-1.64	1.483e-10	0.04	5.881e-12	1.009	[4823]	108	3.793e-12	1.036	4828	101	1.427e-12	1.021	4854	93	4842	97
HR1325	4.50	-0.17	5.311e-09	0.00	2.077e-10	1.013	5035	94	1.294e-10	1.034	5056	84	4.881e-11	1.024	5030	74	5040	83
G008-016	4.50	-1.61	5.588e-11	0.00	1.519e-12	1.009	5998	94	7.974e-13	1.019	6048	61	2.949e-13	1.017	6044	75	6034	74
vB 17	4.50	0.10	1.145e-10	0.00	3.936e-12	1.015	5502	150	2.112e-12	1.022	5619	77	8.089e-13	1.018	5537	68	5561	87
vA 60	4.50	0.10	1.613e-10	0.00	5.241e-12	1.014	5668	152	2.737e-12	1.019	5794	79	1.026e-12	1.015	5746	71	5749	90
vA 79	4.00	0.10	7.602e-10	0.00	1.773e-11	1.012	6684	163	8.370e-12	1.006	6749	89	3.037e-12	1.006	6750	83	6736	102
vA 215	4.00	0.10	5.826e-10	0.00	1.382e-11	1.012	6627	163	6.590e-12	1.007	6682	89	2.369e-12	1.007	6707	83	6681	102
vB 49	4.50	0.10	1.351e-10	0.00	4.206e-12	1.014	5800	154	2.173e-12	1.017	5900	80	8.056e-13	1.014	5870	72	5868	91
vA 315	4.00	0.10	4.208e-10	0.00	1.057e-11	1.012	6454	161	5.136e-12	1.009	6509	87	1.870e-12	1.009	6509	80	6498	99
vA 548	5.00	0.10	3.241e-11	0.00	1.558e-12	1.013	[4303]	107	1.056e-12	1.050	4557	64	4.191e-13	1.029	4447	55	4498	59
vA 560	4.50	0.10	6.937e-11	0.00	2.696e-12	1.015	5097	127	1.561e-12	1.030	5235	72	5.941e-13	1.021	5173	64	5180	80
vA 625	4.00	0.10	2.032e-10	0.00	5.859e-12	1.014	6035	157	2.949e-12	1.014	6118	83	1.090e-12	1.012	6093	75	6091	94
vA 692	4.50	0.10	9.660e-11	0.00	3.332e-12	1.015	5485	150	1.854e-12	1.023	5543	76	7.123e-13	1.018	5455	67	5494	86
vA 712	5.00	0.10	5.372e-11	0.00	2.098e-12	1.015	5082	139	1.263e-12	1.032	5147	71	4.860e-13	1.022	5072	63	5102	81
vA 747	5.00	0.10	4.262e-11	0.00	1.713e-12	1.014	[4994]	136	1.052e-12	1.035	5057	70	4.084e-13	1.023	4973	61	5009	79
vA 748	4.50	0.10	1.791e-10	0.00	5.616e-12	1.014	5780	154	2.956e-12	1.018	5847	79	1.104e-12	1.015	5805	72	5816	91
vA 778	5.00	0.10	5.399e-11	0.00	2.100e-12	1.015	5095	135	1.240e-12	1.031	5193	72	4.770e-13	1.022	5115	63	5140	81
G008-050	4.50	-0.32	3.168e-12	0.00	1.283e-13	1.012	[4883]	89	8.827e-14	1.041	4805	110	3.494e-14	1.026	4705	60	4740	78
HR1536	4.00	0.13	1.307e-09	0.00	4.031e-11	1.014	5830	148	2.177e-11	1.018	5830	81	8.030e-12	1.015	5812	61	5822	85
HR1543	4.50	0.04	1.374e-08	0.00	3.341e-10	1.012	6541	162	—	—	—	—	6.234e-11	1.011	6454	80	6482	107
GJ182	5.00	0.00	6.623e-11	0.00	4.091e-12	—	<3500	—	3.403e-12	—	<3500	—	1.227e-12	1.034	3639	136	(3639)	—
G084-029	4.50	-2.01	3.404e-11	0.00	8.901e-13	1.009	6084	107	4.719e-13	1.019	6099	70	1.704e-13	1.016	6141	78	6110	82
G096-020	4.50	-1.05	3.738e-11	0.00	9.760e-13	1.010	6168	126	5.029e-13	1.016	6208	73	1.798e-13	1.015	6268	58	6226	77
G084-037	4.50	-1.19	3.633e-11	0.02	1.055e-12	1.009	5830	83	5.743e-13	1.021	5840	53	2.079e-13	1.018	5886	62	5853	64
HR1729	4.00	0.00	3.509e-09	0.00	1.060e-10	1.013	5862	155	—	—	—	—	2.112e-11	1.016	5840	72	5847	98
G086-039	4.50	-1.61	8.291e-12	0.00	3.479e-13	1.009	[4642]	172	2.248e-13	1.038	4723	56	8.501e-14	1.021	4750	40	4739	47
G096-038	4.50	-0.09	5.281e-12	0.03	2.131e-13	1.014	[4938]	101	1.417e-13	1.039	4886	68	5.231e-14	1.025	4898	60	4892	64
G099-015	5.00	-1.50	7.424e-10	0.00	3.687e-11	1.011	[3954]	211	3.314e-11	—	<3500	—	1.242e-11	1.027	3737	123	(3737)	—
HR1925	4.00	-0.20	9.735e-10	0.00	3.717e-11	1.013	5110	95	2.169e-11	1.030	5237	47	8.282e-12	1.021	5172	40	5185	53
G102-020	4.50	-1.39	2.479e-11	0.02	8.779e-13	1.009	5221	120	5.150e-13	1.029	5267	125	1.927e-13	1.020	5269	89	5254	109
G191-051	5.00	0.00	7.424e-10	0.00	3.687e-11	1.012	[4101]	198	3.262e-11	1.054	[3619]	300	1.249e-11	1.032	3832	109	(3832)	—
HR1983	4.00	-0.16	9.574e-09	0.00	2.511e-10	1.012	6277	159	—	—	—	—	4.745e-11	1.014	6251	77	6260	104
LTT2437	4.00	0.00	8.201e-13	0.18	2.294e-14	1.013	6101	157	1.306e-14	1.017	5917	80	4.965e-15	1.015	5834	72	5918	92
HR2085	4.00	0.06	8.301e-09	0.00	1.701e-10	1.010	7083	166	—	—	—	—	3.003e-11	1.007	6978	86	7013	113
G100-054	4.50	-1.26	5.712e-11	0.00	1.978e-12	1.009	5299	176	1.155e-12	1.028	5328	92	4.333e-13	1.020	5320	72	5319	99
G102-047	4.50	-1.74	2.601e-11	0.05	8.658e-13	1.008	5375	136	5.129e-13	1.027	5336	68	1.909e-13	1.020	5359	60	5353	77
GJ229	5.00	0.00	5.579e-10	0.00	2.958e-11	1.012	[3836]	223	2.505e-11	1.058	[3626]	300	9.663e-12	1.034	3814	112	(3814)	—
G098-056	4.50	-1.32	8.469e-12	0.00	2.934e-13	1.009	5293	162	1.665e-13	1.027	5375	74	6.148e-14	1.019	5400	45	5376	72
G098-058	4.50	-1.86	9.307e-11	0.05	2.939e-12	1.008	5523	84	1.706e-12	1.026	5487	53	6.284e-13	1.019	5523	43	5510	56
G101-033	4.50	-0.37	2.455e-11	0.00	8.795e-13	1.012	5289	161	5.271e-13	1.029	5286	67	1.955e-13	1.020	5281	65	5284	82
G101-034	4.50	-1.83	2.030e-11	0.10	6.771e-13	1.008	5357	133	4.210e-13	1.028	5227	74	1.531e-13	1.020	5305	49	5289	72
HD45281	4.50	0.00	7.206e-11	0.00	2.385e-12	1.014	5587	153	1.247e-12	1.020	5739	79	4.585e-13	1.016	5733	72	5703	91
HD45282	5.00	-1.04	1.875e-10	0.00	6.783e-12	1.010	5187	75	4.116e-12	1.031	5190	72	1.531e-12	1.020	5198	43	5193	59
HR2324	4.00	0.00	1.138e-09	0.00	1.516e-11	1.002	8402	171	6.117e-12	0.997	8534	107	2.253e-12	0.995	8439	103	8464	120
G106-053	4.50	-0.36	3.172e-11	0.00	1.323e-12	1.012	[4787]	172	8.531e-13	1.039	4866	58	3.212e-13	1.024	4847	40	4855	47
HR2383	4.00	0.00	6.905e-10	0.00	8.216e-12	1.001	8764	171	3.259e-12	0.996	8913	110	1.210e-12	0.995	8786	107	8825	124
G105-049	5.00	-1.50	1.085e-10	0.00	5.952e-12	—	<3500	—	5.325e-12	—	<3500	—	1.972e-12	1.028	3586	142	(3586)	—
G105-050	4.50	-1.59	1.140e-11	0.01	4.658e-13	1.009	[4747]	118	2.903e-13	1.036	4841	69	1.112e-13	1.021	4834	52	4837	59
G103-050	5.00	-3.00	5.458e-12	0.03	2.389e-13	1.013	[4647]	205	1.562e-13	1.042	4778	161	6.185e-14	1.027	4669	108	4713	129
G192-043	4.50	-1.56	2.133e-11	0.00	5.721e-13	1.009	6041	188	2.985e-13	1.018	6093	101	1.097e-13	1.016	6099	85	6085	111
HR2530	4.50	-0.88	1.437e-09	0.03	3.196e-11	1.009	6685	130	1.593e-11	1.011	6673	88	5.757e-12	1.011	6681	82	6679	96
G110-021	5.00	-1.50	2.908e-11	0.00	1.432e-12	1.011	[4009]	206	1.176e-12	1.050	[3655]	300	4.176e-13	1.024	4026	81	(4026)	—
G088-010	4.50	-2.20	5.230e-12	0.00	1.477e-13	1.008	5837	108	7.972e-14	1.021	5876	80	2.993e-14	1.018	5851	54	5856	74

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G087-033	5.00	-1.50	6.777e-11	0.00	3.864e-12	1.011	[3500]	253	3.270e-12	—	<3500	—	1.245e-12	1.029	3570	144	(3570)	—
G107-065	5.00	0.00	6.272e-11	0.00	3.384e-12	1.012	[3779]	182	2.859e-12	1.063	[3661]	300	1.079e-12	1.034	3880	102	(3880)	—
G089-014	4.50	-1.85	1.992e-11	0.00	5.736e-13	1.008	5804	126	3.044e-13	1.021	5881	54	1.122e-13	1.018	5895	73	5871	75
G088-027	4.50	-2.21	1.466e-11	0.00	3.994e-13	1.008	5948	162	2.092e-13	1.020	6030	61	7.723e-14	1.017	6030	84	6015	87
HR2852	4.00	-0.31	5.517e-09	0.00	1.113e-10	1.009	7080	166	—	—	—	—	1.969e-11	1.009	6989	86	7020	113
G090-003	4.50	-1.99	2.202e-11	0.04	6.419e-13	1.008	5762	199	3.533e-13	1.022	5770	118	1.287e-13	1.018	5813	108	5786	132
G088-032	4.50	-2.59	1.369e-11	0.00	3.431e-13	1.008	6191	86	1.803e-13	1.017	6206	56	6.568e-14	1.016	6222	65	6208	67
HR2883	4.50	-0.99	1.212e-09	0.00	3.457e-11	1.010	5909	186	1.846e-11	1.019	5937	90	6.838e-12	1.017	5929	75	5928	101
G088-041	4.00	-0.08	3.124e-10	0.00	9.706e-12	1.013	5776	154	5.207e-12	1.019	5818	79	1.973e-12	1.016	5750	71	5781	90
G087-047	4.50	-0.88	2.226e-11	0.00	8.170e-13	1.010	5150	262	4.914e-13	1.031	5192	81	1.828e-13	1.020	5194	72	5188	100
W5058	4.50	-1.15	1.067e-11	0.00	3.643e-13	1.009	5349	118	2.077e-13	1.027	5411	74	7.703e-14	1.019	5420	67	5400	81
HR2943	4.43	-0.05	1.844e-07	0.00	4.400e-09	1.011	6585	162	2.160e-09	1.009	6579	87	7.908e-10	1.010	6576	81	6579	100
G112-036	4.50	-0.88	7.553e-11	0.06	2.812e-12	1.010	5103	208	1.782e-12	1.034	5065	61	6.562e-13	1.021	5090	49	5082	72
G112-038	5.00	-1.50	1.567e-10	0.00	8.307e-12	1.011	[3602]	245	7.089e-12	—	<3500	—	2.569e-12	1.026	3772	118	(3772)	—
G112-043	4.50	-1.61	2.402e-11	0.01	6.448e-13	1.009	6033	110	3.370e-13	1.018	6085	84	1.252e-13	1.017	6069	66	6065	83
G091-011	5.00	0.00	2.766e-11	0.00	1.620e-12	—	<3500	—	1.196e-12	1.067	3926	348	4.708e-13	1.034	3907	84	(3907)	—
HR3029	4.00	0.00	2.098e-10	0.00	3.769e-12	1.007	7491	168	1.764e-12	1.003	7382	96	6.477e-13	1.003	7348	91	7392	110
HR3064	4.00	0.00	2.325e-09	0.00	7.342e-11	1.014	5738	153	4.001e-11	1.020	5740	78	1.492e-11	1.017	5711	70	5727	89
G090-025	4.50	-1.82	1.493e-10	0.00	4.891e-12	1.008	5422	101	2.771e-12	1.025	5448	50	1.049e-12	1.020	5443	69	5441	68
G090-036	4.50	-1.61	2.516e-12	0.00	8.603e-14	1.009	5306	206	4.972e-14	1.027	5341	147	1.828e-14	1.020	5385	105	5353	142
G112-054	4.50	-0.65	3.291e-10	0.00	1.229e-11	1.011	5118	122	7.449e-12	1.032	5161	73	2.836e-12	1.021	5117	71	5134	83
HD65583	4.50	-0.60	4.745e-10	0.00	1.720e-11	1.011	5226	79	1.028e-11	1.030	5251	49	3.830e-12	1.020	5244	55	5242	59
HD68017	4.00	-0.42	5.373e-10	0.00	1.797e-11	1.011	5503	150	1.011e-11	1.024	5547	76	3.843e-12	1.018	5485	68	5512	87
G194-022	4.50	-1.64	3.539e-11	0.00	9.987e-13	1.009	5877	170	5.195e-13	1.020	5985	112	1.905e-13	1.017	6004	102	5967	122
HR3176	4.00	0.14	2.038e-09	0.00	6.436e-11	1.014	5762	153	3.425e-11	1.019	5797	79	1.272e-11	1.016	5775	71	5781	90
G251-054	5.00	-1.73	2.841e-11	0.00	9.877e-13	1.009	5255	80	5.656e-13	1.027	5309	76	2.115e-13	1.020	5330	74	5308	82
HR3262	4.00	-0.50	2.351e-09	0.00	6.186e-11	1.011	6216	86	3.170e-11	1.014	6245	84	1.154e-11	1.014	6255	52	6242	70
G051-010	4.50	-0.04	4.062e-11	0.05	1.821e-12	1.013	4560	156	1.311e-12	1.050	4569	64	4.827e-13	1.028	4587	57	4579	60
HD70958	4.00	-0.41	1.518e-09	0.00	3.980e-11	1.011	6246	159	2.007e-11	1.014	6292	84	7.407e-12	1.013	6273	77	6275	96
G113-040	4.50	-1.13	6.796e-12	0.04	2.781e-13	1.010	[4776]	99	1.872e-13	1.040	4761	67	7.231e-14	1.022	4722	58	4740	62
HR3427	4.00	0.00	5.794e-10	0.00	7.123e-12	1.001	8657	171	2.780e-12	0.996	8863	109	1.021e-12	0.995	8772	107	8783	123
G009-014	4.50	-0.76	2.657e-11	0.00	1.003e-12	1.011	5071	127	6.369e-13	1.034	5046	84	2.353e-13	1.021	5063	75	5059	91
HD74000	4.50	-2.00	3.966e-11	0.00	9.896e-13	1.009	6231	159	5.189e-13	1.017	6236	84	1.924e-13	1.016	6209	77	6224	96
G009-016	4.50	-1.31	5.079e-11	0.00	1.082e-12	1.008	6791	167	5.355e-13	1.010	6771	67	1.937e-13	1.011	6776	67	6776	84
G046-005	4.50	-1.70	9.626e-12	0.00	3.755e-13	1.009	4883	174	2.319e-13	1.033	4938	71	8.715e-14	1.020	4964	84	4950	77
G009-031	4.50	-0.85	1.328e-11	0.00	4.300e-13	1.010	5543	96	2.405e-13	1.024	5581	61	8.944e-14	1.018	5572	45	5569	61
HR3578	4.50	-1.05	1.278e-09	0.00	3.950e-11	1.010	5663	100	2.138e-11	1.022	5735	72	7.823e-12	1.018	5763	66	5727	77
G009-036	4.50	-1.18	4.757e-12	0.00	1.507e-13	1.009	5571	187	8.246e-14	1.024	5643	106	3.076e-14	1.019	5636	97	5625	120
G114-026	4.50	-1.47	3.932e-11	0.00	1.157e-12	1.009	5768	83	6.270e-13	1.022	5805	79	2.292e-13	1.018	5835	49	5809	66
G115-049	4.50	-1.86	6.573e-12	0.00	1.792e-13	1.009	5967	106	9.852e-14	1.021	5926	80	3.597e-14	1.017	5958	50	5950	72
G047-026	5.00	-1.50	7.436e-11	0.00	4.360e-12	—	<3500	—	3.500e-12	—	<3500	—	1.364e-12	1.029	3573	144	(3573)	—
G115-058	4.50	-1.65	3.972e-12	0.00	9.760e-14	1.009	6303	255	5.314e-14	1.017	6195	166	1.880e-14	1.015	6279	114	6257	160
G046-031	4.50	-0.79	1.265e-11	0.00	3.643e-13	1.010	5897	143	2.012e-13	1.020	5853	69	7.388e-14	1.017	5864	92	5866	93
HD80218	4.00	-0.39	5.927e-10	0.00	1.659e-11	1.012	6046	157	8.517e-12	1.016	6106	82	3.149e-12	1.014	6089	75	6087	94
G041-034	4.50	0.00	4.131e-11	0.00	1.554e-12	1.014	5180	144	9.118e-13	1.029	5257	49	3.498e-13	1.022	5182	54	5215	65
HR3750	4.00	-0.31	1.964e-09	0.00	6.419e-11	1.012	5587	82	3.553e-11	1.023	5632	52	1.324e-11	1.017	5604	59	5611	62
HR3775	4.00	-0.01	1.410e-08	0.00	3.593e-10	1.012	6387	176	1.846e-10	1.011	6339	55	6.840e-11	1.011	6308	97	6338	88
G041-041	5.00	-2.89	1.016e-11	0.00	2.436e-13	1.008	6323	137	1.289e-13	1.016	6292	84	4.550e-14	1.013	6371	69	6333	89
G195-034	4.50	-1.75	5.485e-12	0.00	1.491e-13	1.009	5991	240	8.308e-14	1.021	5908	54	2.855e-14	1.017	6067	103	5966	93
G048-029	4.50	-2.81	1.894e-11	0.00	4.671e-13	1.008	6240	108	2.377e-13	1.016	6317	57	8.488e-14	1.015	6371	94	6313	80
HD83769	4.00	-2.66	2.444e-11	0.01	5.463e-13	1.008	6584	130	2.620e-13	1.012	6698	89	9.463e-14	1.013	6719	83	6678	97
G043-003	4.50	-2.49	1.363e-10	0.00	3.253e-12	1.009	6355	144	1.719e-12	1.016	6312	68	6.226e-13	1.015	6335	68	6330	83
BD +44 1910	4.50	-2.40	1.236e-11	0.00	3.247e-13	1.008	6053	157	1.733e-13	1.019	6061	82	6.365e-14	1.017	6070	75	6063	94
W6296	4.50	-2.97	1.271e-11	0.00	3.241e-13	1.008	6131	110	1.694e-13	1.018	6174	54	6.274e-14	1.017	6155	76	6158	74
G048-039	4.50	-0.60	2.598e-10	0.00	8.779e-12	1.011	5439	80	4.933e-12	1.025	5509	76	1.873e-12	1.019	5453	45	5465	63
G161-082	4.50	-1.38	4.747e-12	0.00	1.609e-13	1.009	5348	183	9.215e-14	1.027	5395	108	3.435e-14	1.020	5403	82	5389	111
HD87140	4.50	-1.68	9.100e-11	0.05	3.161e-12	1.009	5259	108	1.926e-12	1.029	5198	54	7.133e-13	1.020	5241	42	5229	58
G196-009	5.00	-1.00	1.373e-09	0.00	7.576e-11	—	<3500	—	6.493e-11	—	<3500	—	2.283e-11	1.028	3764	119	(3764)	—
GJ378.2	5.00	-1.00	6.944e-11	0.00	4.091e-12	—	<3500	—	3.425e-12	—	<3500	—	1.233e-12	1.030	3637	136	(3637)	—
GJ383	5.00	-1.00	7.859e-11	0.00	4.785e-12	—	<3500	—	3.777e-12	—	<3500	—	1.444e-12	1.031	3580	143	(3580)	—

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G044-006	4.50	-0.78	2.275e-10	0.00	7.103e-12	1.010	5658	100	3.964e-12	1.023	5664	48	1.453e-12	1.018	5683	70	5669	66
HR4030	4.00	-0.03	1.108e-09	0.00	3.643e-11	1.014	5602	151	1.984e-11	1.022	5654	77	6.904e-12	1.016	5769	71	5692	89
HR4039	4.50	-0.19	1.255e-09	0.00	3.596e-11	1.012	6008	156	1.877e-11	1.016	6028	81	6.891e-12	1.014	6033	74	6026	73
G055-017	4.50	-1.48	1.590e-12	0.00	5.314e-14	1.009	5377	118	3.233e-14	1.028	5297	73	1.199e-14	1.020	5320	66	5325	80
G053-041	4.50	-1.39	1.089e-11	0.00	3.167e-13	1.009	5808	139	1.696e-13	1.021	5860	68	6.328e-14	1.018	5845	65	5844	80
HR4098	4.00	-0.23	7.305e-10	0.00	2.298e-11	1.012	5714	137	1.262e-11	1.021	5737	59	4.725e-12	1.017	5693	58	5715	72
G162-068	4.50	-0.81	1.868e-11	0.00	6.419e-13	1.010	5361	80	3.763e-13	1.028	5370	50	1.396e-13	1.019	5371	45	5368	55
G044-030	4.50	-1.02	8.947e-12	0.00	3.135e-13	1.010	5285	103	1.815e-13	1.028	5341	59	6.729e-14	1.019	5349	45	5334	61
GJ400AB	5.00	-1.50	1.441e-10	0.00	8.461e-12	—	<3500	—	6.969e-12	—	<3500	—	2.647e-12	1.029	3570	144	(3570)	—
G119-032	4.50	-1.86	2.297e-11	0.00	6.592e-13	1.008	5810	139	3.636e-13	1.022	5804	89	1.330e-13	1.018	5837	149	5815	119
G058-023	4.50	-1.04	3.046e-11	0.00	1.022e-12	1.009	5412	95	5.924e-13	1.027	5423	58	2.222e-13	1.019	5405	53	5413	64
G196-047	4.50	-1.64	2.752e-12	0.00	8.338e-14	1.009	5659	137	5.118e-14	1.026	5465	119	2.008e-14	1.020	5376	91	5481	112
G058-025	4.50	-1.50	1.438e-10	0.00	3.911e-12	1.009	6008	181	2.132e-12	1.020	5969	117	7.672e-13	1.017	6027	113	6001	131
G055-044	4.50	-0.23	4.919e-11	0.00	2.396e-12	1.011	[4181]	157	1.764e-12	1.057	4367	69	6.591e-13	1.029	4373	66	4370	67
GJ410	5.00	-1.00	1.275e-10	0.00	6.833e-12	1.011	[3582]	246	6.005e-12	—	<3500	—	2.267e-12	1.030	3634	136	(3634)	—
G119-052	5.00	-0.20	1.173e-09	0.00	6.598e-11	1.012	[3544]	195	5.327e-11	1.056	[3525]	300	1.975e-11	1.032	3828	91	(3828)	—
G176-011	5.00	-1.50	3.202e-10	0.00	1.752e-11	—	<3500	—	1.440e-11	—	<3500	—	5.471e-12	1.027	3696	128	(3696)	—
G119-059	5.00	-1.50	1.324e-10	0.00	6.592e-12	1.011	[3939]	213	5.785e-12	1.055	[3507]	300	2.158e-12	1.026	3783	116	(3783)	—
G010-004	4.50	-2.30	1.020e-11	0.06	3.563e-13	1.008	5197	84	2.131e-13	1.028	5174	57	8.027e-14	1.020	5203	42	5192	56
G056-022	4.50	-0.89	1.279e-12	0.00	5.393e-14	1.010	4691	250	3.396e-14	1.039	4844	63	1.391e-14	1.023	4700	73	4777	68
G119-064	4.50	-1.71	3.507e-11	0.00	8.926e-13	1.009	6188	108	4.688e-13	1.017	6193	71	1.690e-13	1.016	6238	92	6206	88
GJ421A	5.00	-1.50	5.965e-11	0.00	3.250e-12	—	<3500	—	2.696e-12	—	<3500	—	9.584e-13	1.026	3806	113	(3806)	—
GJ421B	5.00	-1.50	5.931e-11	0.00	3.403e-12	—	<3500	—	2.825e-12	—	<3500	—	1.005e-12	1.027	3714	126	(3714)	—
HD97916	4.00	-1.22	5.715e-11	0.00	1.398e-12	1.010	6365	208	7.067e-13	1.015	6389	135	2.558e-13	1.015	6416	139	6393	155
G147-036	4.00	0.14	5.246e-11	0.00	1.712e-12	1.014	5657	122	9.288e-13	1.020	5695	72	3.513e-13	1.017	5633	52	5659	73
G197-008	4.00	-0.39	4.003e-12	0.00	1.248e-13	1.012	5711	202	7.182e-14	1.023	5633	132	2.690e-14	1.018	5601	187	5645	168
G236-065	5.00	-1.50	1.446e-10	0.00	8.619e-12	1.011	[3456]	257	6.813e-12	—	<3500	—	2.646e-12	1.029	3576	144	(3576)	—
G056-036	4.50	-1.03	2.780e-11	0.00	7.948e-13	1.010	5893	127	4.269e-13	1.020	5913	90	1.558e-13	1.017	5938	75	5918	93
HR4421	4.50	-0.61	1.233e-09	0.00	2.841e-11	1.009	6606	120	1.397e-11	1.010	6633	81	5.045e-12	1.010	6650	62	6624	82
HD101177	4.00	-0.13	7.558e-10	0.00	2.479e-11	1.013	5599	151	1.485e-11	1.025	5486	75	5.613e-12	1.019	5428	67	5483	86
HR4496	4.50	-0.14	2.099e-09	0.00	7.696e-11	1.013	5256	146	—	—	—	—	1.592e-11	1.020	5382	66	5342	91
HR4501	4.50	-0.82	1.381e-09	0.00	3.576e-11	1.010	6225	127	1.825e-11	1.015	6268	84	6.613e-12	1.014	6290	78	6266	92
G121-012	4.50	-1.17	1.966e-11	0.00	5.539e-13	1.009	5926	109	2.938e-13	1.019	5966	50	1.084e-13	1.017	5970	120	5957	80
HR4533	4.00	0.12	9.014e-10	0.00	2.385e-11	1.013	6300	96	1.195e-11	1.011	6319	55	4.383e-12	1.011	6309	51	6311	62
G176-053	4.50	-1.54	3.136e-11	0.00	9.877e-13	1.009	5556	136	5.509e-13	1.024	5590	57	2.039e-13	1.019	5607	45	5593	64
HR4540	4.00	0.21	9.419e-09	0.00	2.696e-10	1.014	6074	116	1.373e-10	1.014	6115	68	5.076e-11	1.012	6088	70	6095	80
HD103095	4.50	-1.35	8.381e-10	0.00	3.182e-11	1.009	5009	91	1.957e-11	1.033	5040	65	7.413e-12	1.021	5031	50	5029	65
G122-066	4.00	0.00	5.406e-10	0.00	2.915e-11	1.010	[3794]	227	1.976e-11	1.058	4358	63	7.282e-12	1.032	4380	54	4370	58
HD104636	4.00	0.00	1.473e-10	0.00	2.980e-12	1.010	7108	166	1.441e-12	1.007	7008	92	5.309e-13	1.008	6982	86	7019	105
HD104674	4.00	0.00	9.870e-11	0.00	5.270e-12	1.010	[3830]	223	3.415e-12	1.054	4452	64	1.287e-12	1.032	4434	55	4442	59
HR4623	4.00	-0.60	6.467e-09	0.00	1.326e-10	1.008	6984	86	6.286e-11	1.006	7009	62	2.266e-11	1.006	7009	58	7003	67
HD105601	4.00	0.00	3.041e-10	0.00	5.403e-12	1.006	7505	168	2.451e-12	1.001	7467	97	8.765e-13	0.999	7481	92	7481	111
HD105755	4.00	-1.08	1.040e-10	0.00	3.072e-12	1.010	5795	126	1.673e-12	1.022	5807	53	6.196e-13	1.018	5809	48	5806	63
G011-044	4.50	-1.80	1.011e-11	0.00	2.789e-13	1.008	5933	174	1.514e-13	1.020	5925	98	5.521e-14	1.018	5964	85	5943	108
G012-021	4.50	-1.40	2.429e-11	0.00	6.783e-13	1.009	5931	84	3.609e-13	1.020	5966	69	1.330e-13	1.017	5974	50	5960	65
G197-049	5.00	-1.50	8.821e-11	0.00	5.141e-12	—	<3500	—	4.310e-12	—	<3500	—	1.626e-12	1.029	3565	145	(3565)	—
HR4657	4.50	-0.78	9.749e-10	0.00	2.551e-11	1.010	6196	127	1.322e-11	1.016	6209	63	4.837e-12	1.014	6215	77	6208	82
G012-023	4.50	-1.13	1.300e-12	0.00	4.340e-14	1.009	5420	238	2.515e-14	1.027	5427	205	8.907e-15	1.019	5526	176	5463	203
HD106965	4.00	0.00	1.750e-10	0.00	3.325e-12	1.009	7303	167	1.413e-12	1.001	7462	97	5.019e-13	0.999	7491	92	7441	110
HR4688	4.00	0.38	7.545e-10	0.00	1.969e-11	1.015	6380	119	9.922e-12	1.010	6341	64	3.654e-12	1.010	6327	59	6343	73
HD107906	4.00	0.00	5.851e-11	0.00	2.991e-12	1.011	[4019]	205	1.811e-12	1.047	4636	66	6.675e-13	1.029	4651	57	4644	61
HR4689	4.00	0.11	7.021e-09	0.00	9.067e-11	0.993	8561	137	3.534e-11	0.987	8759	109	1.276e-11	0.981	8687	106	8690	116
G237-062	4.00	-0.39	1.862e-10	0.01	6.520e-12	1.012	5355	148	3.877e-12	1.028	5347	74	1.478e-12	1.020	5289	65	5323	84
G059-018	4.50	-1.16	2.949e-11	0.05	1.011e-12	1.009	5331	212	6.102e-13	1.029	5293	113	2.285e-13	1.020	5287	129	5299	141
HD107906	4.00	0.00	7.958e-11	0.00	3.016e-12	1.014	5156	74	1.770e-12	1.029	5234	49	6.639e-13	1.023	5207	43	5205	52
G013-035	4.50	-1.98	3.875e-11	0.00	1.008e-12	1.008	6098	157	5.381e-13	1.018	6092	82	1.975e-13	1.017	6101	75	6097	94
G013-043	4.00	-0.50	7.260e-11	0.00	2.548e-12	1.011	5337	147	1.489e-12	1.028	5366	74	5.665e-13	1.020	5313	66	5338	85
HR4785	4.50	-0.25	5.319e-09	0.00	1.550e-10	1.012	5938	156	—	—	—	—	3.196e-11	1.016	5835	72	5867	99
G012-039	5.00	-1.50	1.002e-10	0.00	5.689e-12	—	<3500	—	4.814e-12	—	<3500	—	1.832e-12	1.029	3576	144	(3576)	—
G059-024	4.50	-2.69	4.653e-12	0.00	1.195e-13	1.008	6111	192	6.424e-14	1.019	6091	53	2.321e-14	1.017	6133	83	6108	83

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_I	q_I	T_I	ΔT_I	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G059-027	4.50	-2.34	1.255e-11	0.00	3.232e-13	1.008	6115	180	1.718e-13	1.018	6117	105	6.393e-14	1.017	6092	117	6107	127
G060-026	4.50	-1.24	3.568e-11	0.00	1.243e-12	1.009	5281	76	7.432e-13	1.029	5274	47	2.780e-13	1.020	5273	42	5275	52
G237-072	4.50	-0.97	5.414e-11	0.00	1.687e-12	1.010	5648	152	9.482e-13	1.023	5643	77	3.502e-13	1.018	5651	70	5647	89
G014-006	5.00	0.10	2.599e-10	0.00	1.505e-11	1.013	[3529]	175	1.322e-11	—	<3500	--	4.626e-12	1.035	3748	121	(3748)	—
HD111980	4.00	-1.12	1.273e-10	0.02	3.987e-12	1.009	5611	148	2.226e-12	1.024	5628	67	8.287e-13	1.019	5625	49	5624	71
G060-048	4.50	-1.92	8.449e-12	0.00	2.452e-13	1.008	5777	92	1.337e-13	1.021	5794	51	4.933e-14	1.018	5815	99	5795	74
HD112758	4.50	-0.29	2.994e-10	0.00	1.134e-11	1.013	5118	110	6.969e-12	1.032	5136	62	2.629e-12	1.022	5103	39	5116	59
G060-057	5.00	0.00	1.520e-10	0.00	7.562e-12	1.012	[4094]	199	6.429e-12	1.054	[3723]	300	2.515e-12	1.032	3870	104	(3870)	—
G014-022	4.50	0.06	7.247e-11	0.00	2.579e-12	1.014	5372	80	1.457e-12	1.025	5436	49	5.429e-13	1.019	5414	50	5413	57
G014-024	4.50	-2.62	2.418e-12	0.01	9.176e-14	1.008	4922	137	5.552e-14	1.030	4941	71	2.063e-14	1.020	5029	64	4974	81
G060-066	4.50	-0.17	3.814e-11	0.00	1.296e-12	1.013	5490	90	7.357e-13	1.024	5511	57	2.731e-13	1.018	5495	63	5500	67
G014-032	4.50	-1.58	1.660e-10	0.00	6.802e-12	1.009	[4730]	124	4.874e-12	1.040	4513	63	1.850e-12	1.021	4566	56	4541	59
G063-005	4.50	-0.34	9.037e-11	0.00	2.891e-12	1.012	5637	179	1.647e-12	1.023	5605	78	6.221e-13	1.018	5558	69	5590	91
G063-006	5.00	0.00	7.138e-12	0.00	3.911e-13	1.012	[3719]	154	3.490e-13	—	<3500	—	1.218e-13	1.034	3900	75	(3900)	—
G061-038	4.50	-0.79	3.204e-11	0.00	1.054e-12	1.010	5504	244	5.980e-13	1.025	5528	148	2.231e-13	1.019	5512	129	5516	161
HR4983	4.50	0.10	5.241e-09	0.00	1.555e-10	1.014	5944	156	8.111e-11	1.016	5977	81	2.987e-11	1.014	5962	74	5964	93
G063-009	4.00	-0.80	3.353e-10	0.00	9.760e-12	1.010	5867	124	5.246e-12	1.020	5884	52	1.931e-12	1.017	5891	55	5884	66
G014-039	4.50	-2.06	2.633e-12	0.00	1.110e-13	1.009	[4595]	101	7.820e-14	1.039	4429	75	2.907e-14	1.021	4560	68	4498	71
G014-045	4.50	-0.22	1.855e-11	0.00	8.579e-13	1.012	[4411]	73	6.230e-13	1.052	4500	41	2.369e-13	1.028	4462	37	4480	39
G062-030	4.50	-0.75	3.600e-11	0.00	1.252e-12	1.011	5333	100	7.408e-13	1.028	5334	77	2.726e-13	1.020	5349	50	5341	70
G164-067	4.50	0.00	1.748e-10	0.00	6.046e-12	1.014	5452	101	3.314e-12	1.023	5549	76	1.254e-12	1.018	5498	68	5504	79
G063-026	4.50	-1.70	3.754e-12	0.00	1.051e-13	1.009	5900	149	5.489e-14	1.020	5988	55	2.042e-14	1.018	5978	63	5970	74
G062-040	4.50	-2.05	1.242e-12	0.00	4.400e-14	1.008	5163	205	2.942e-14	1.032	4928	122	1.108e-14	1.024	4961	108	4994	134
G014-054	4.00	0.12	2.899e-10	0.00	9.407e-12	1.014	5672	103	5.128e-12	1.020	5697	52	1.904e-12	1.017	5673	47	5682	60
HD118100	4.50	-0.07	9.545e-11	0.00	5.029e-12	1.012	[3850]	221	3.834e-12	1.065	4138	100	1.419e-12	1.032	4199	47	4179	64
G062-052	4.50	-1.16	1.351e-11	0.00	4.780e-13	1.009	5243	120	2.913e-13	1.030	5215	49	1.104e-13	1.020	5187	54	5209	63
G165-019	5.00	-1.50	1.588e-10	0.00	8.860e-12	—	<3500	—	7.576e-12	—	<3500	—	2.768e-12	1.028	3658	133	(3658)	-
G064-012	5.00	-3.35	7.996e-12	0.02	1.806e-13	1.009	6510	123	9.599e-14	1.015	6418	77	3.401e-14	1.014	6490	74	6468	87
G063-046	4.50	-0.83	5.014e-11	0.00	1.551e-12	1.010	5682	79	8.552e-13	1.022	5706	52	3.140e-13	1.018	5721	56	5705	60
G062-061	4.50	-0.08	1.399e-10	0.00	4.076e-12	1.013	5968	134	2.229e-12	1.018	5900	68	8.329e-13	1.015	5881	69	5898	82
G062-062	5.00	-1.50	6.926e-11	0.00	3.596e-12	1.011	[3753]	231	3.135e-12	—	<3500	—	1.070e-12	1.025	3878	103	(3878)	—
G165-039	4.50	-2.41	2.726e-11	0.00	6.721e-13	1.009	6259	86	3.500e-13	1.016	6273	57	1.256e-13	1.015	6316	80	6282	72
G065-022	4.50	-1.75	7.656e-12	0.00	2.902e-13	1.009	[4981]	92	1.801e-13	1.032	4982	62	6.935e-14	1.020	4959	63	4971	62
G064-037	4.50	-2.51	1.047e-11	0.01	2.413e-13	1.009	6469	113	1.250e-13	1.015	6439	56	4.634e-14	1.015	6404	63	6432	70
HD123710	4.50	-1.32	1.479e-10	0.00	4.400e-12	1.009	5756	153	2.429e-12	1.022	5754	78	8.877e-13	1.018	5786	71	5768	90
W8296	4.50	-1.65	1.590e-11	0.00	5.203e-13	1.009	5433	77	2.937e-13	1.026	5479	49	1.117e-13	1.019	5452	44	5457	53
G166-022	5.00	-1.50	1.924e-10	0.00	9.546e-12	1.011	[3970]	210	8.064e-12	1.052	[3582]	300	2.837e-12	1.024	3972	89	(3972)	—
G135-042	4.00	-0.36	1.851e-11	0.00	5.919e-13	1.012	5634	91	3.322e-13	1.023	5635	58	1.262e-13	1.018	5575	45	5608	59
G065-047	4.00	-0.29	8.617e-10	0.00	2.776e-11	1.012	5633	124	1.537e-11	1.022	5663	52	5.725e-12	1.017	5634	59	5646	68
G166-027	5.00	-1.50	9.692e-11	0.00	5.433e-12	—	<3500	—	4.690e-12	—	<3500	—	1.766e-12	1.028	3583	143	(3583)	--
G166-028	5.00	-1.50	9.049e-11	0.00	4.865e-12	1.011	[3521]	252	4.382e-12	—	<3500	—	1.395e-12	1.028	3639	136	(3639)	—
HD126681	4.50	-1.98	5.623e-11	0.00	1.776e-12	1.008	5518	102	9.980e-13	1.025	5546	51	3.738e-13	1.019	5547	46	5541	59
G178-030(3)	4.50	0.00	1.378e-12	0.00	6.389e-14	1.012	[4424]	168	3.612e-14	1.037	4931	83	1.510e-14	1.027	4730	74	4825	78
HR5447	4.00	-0.51	4.328e-09	0.00	9.644e-11	1.009	6728	163	4.824e-11	1.010	6679	88	1.722e-11	1.009	6722	83	6707	102
HR5455	4.00	-0.29	8.736e-10	0.00	2.252e-11	1.011	6311	144	1.129e-11	1.013	6351	89	4.088e-12	1.012	6369	83	6349	99
G201-005	4.50	-2.64	7.370e-12	0.00	1.763e-13	1.008	6343	102	9.249e-14	1.016	6320	97	3.387e-14	1.016	6319	144	6328	111
G066-018	4.50	-0.35	2.088e-12	0.00	9.670e-14	1.011	[4382]	142	6.473e-14	1.048	4617	67	2.352e-14	1.026	4666	79	4639	73
HD128959	4.50	-0.88	6.484e-11	0.05	1.887e-12	1.010	5854	411	1.076e-12	1.022	5762	94	4.026e-13	1.018	5737	122	5763	141
G178-041	4.50	-2.64	2.579e-12	0.00	7.169e-14	1.008	5868	84	3.906e-14	1.022	5884	54	1.508e-14	1.018	5799	107	5859	75
HD129653	4.00	0.00	3.032e-10	0.00	4.684e-12	1.003	7940	170	1.987e-12	0.998	7993	102	7.135e-13	0.996	7979	98	7977	116
G066-022	4.50	-1.11	2.044e-11	0.00	7.752e-13	1.010	5030	135	4.646e-13	1.032	5113	110	1.790e-13	1.021	5065	78	5071	102
GJ563.1	5.00	-1.00	6.899e-11	0.00	3.563e-12	1.012	[3796]	226	3.086e-12	--	<3500	—	1.071e-12	1.027	3888	101	(3888)	—
G166-045	4.50	-2.33	3.726e-11	0.01	9.941e-13	1.008	6012	106	5.293e-13	1.019	6034	55	1.931e-13	1.017	6058	75	6037	73
G066-030	4.50	-1.50	1.071e-11	0.01	2.768e-13	1.009	6152	142	1.396e-13	1.016	6261	126	5.238e-14	1.016	6212	77	6211	107
HR5534	4.00	0.20	1.204e-09	0.00	3.479e-11	1.014	6044	85	1.836e-11	1.015	6025	69	6.790e-12	1.013	5995	63	6019	71
G151-010	4.50	-0.50	4.609e-11	0.00	1.665e-12	1.012	5249	219	9.312e-13	1.027	5388	111	3.657e-13	1.020	5280	78	5311	114
G200-062	4.50	-0.55	2.352e-10	0.00	8.950e-12	1.012	5067	107	5.441e-12	1.033	5127	71	2.061e-12	1.022	5092	47	5098	67
HR5568	4.50	0.01	1.970e-09	0.00	8.942e-11	1.013	[4522]	63	6.089e-11	1.047	4640	49	2.354e-11	1.027	4577	38	4605	43
HD132475	4.00	-1.53	1.190e-10	0.03	3.393e-12	1.009	5854	127	1.934e-12	1.023	5767	66	7.136e-13	1.018	5779	48	5788	68
G167-011(4)	4.50	-0.14	5.024e-13	0.00	1.826e-14	1.013	(5277)	—	1.626e-14	1.050	4561	63	5.568e-15	1.026	4707	58	4637	60

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
HR5634	4.00	0.05	2.755e-09	0.00	6.617e-11	1.012	6584	130	3.267e-11	1.009	6570	87	1.191e-11	1.008	6565	81	6571	95
HD134169	4.00	-1.15	2.380e-10	0.00	6.771e-12	1.010	5896	81	3.735e-12	1.022	5855	81	1.383e-12	1.018	5856	92	5870	84
HD134439	4.50	-1.52	7.493e-11	0.00	2.894e-12	1.009	[4932]	88	1.786e-12	1.033	4984	59	6.823e-13	1.020	4967	41	4974	48
HD134440	4.50	-1.57	5.660e-11	0.00	2.313e-12	1.009	[4749]	102	1.515e-12	1.038	4758	42	5.871e-13	1.021	4732	50	4746	46
G015-013	4.50	-1.88	4.471e-12	0.07	1.533e-13	1.008	5279	108	9.339e-14	1.028	5206	111	3.481e-14	1.020	5245	95	5244	104
LTT6079	4.50	-1.89	8.181e-12	0.00	2.520e-13	1.008	5594	121	1.410e-13	1.024	5614	77	5.087e-14	1.019	5687	70	5639	84
G015-023	4.50	-1.42	1.276e-11	0.00	4.607e-13	1.009	5152	117	2.756e-13	1.030	5184	48	1.040e-13	1.020	5176	65	5175	67
G015-024	4.50	-1.44	7.769e-12	0.00	2.413e-13	1.009	5604	106	1.350e-13	1.024	5618	50	5.041e-14	1.019	5616	52	5614	62
HR5758	4.00	0.01	6.049e-10	0.00	1.347e-11	1.010	6810	131	6.365e-12	1.005	6848	90	2.327e-12	1.006	6829	84	6831	98
G152-035	4.00	0.00	4.087e-12	0.00	1.394e-13	1.014	5502	90	7.929e-14	1.024	5499	60	2.956e-14	1.019	5478	51	5491	63
HR5830	4.00	-0.13	1.297e-09	0.00	2.875e-11	1.010	6802	115	1.398e-11	1.007	6785	101	5.110e-12	1.008	6768	65	6782	88
HD140283	4.00	-2.37	3.859e-10	0.00	1.141e-11	1.008	5699	146	6.454e-12	1.025	5676	66	2.379e-12	1.018	5699	47	5691	69
HR5868	4.50	0.05	4.514e-09	0.00	1.346e-10	1.014	5913	155	—	—	—	—	2.657e-11	1.015	5889	73	5897	99
G016-013	4.50	-0.96	2.880e-11	0.00	9.573e-13	1.010	5451	119	5.331e-13	1.025	5530	87	1.981e-13	1.019	5526	94	5507	98
HR5901	4.00	0.00	4.061e-09	0.00	1.704e-10	1.014	[4810]	118	1.115e-10	1.040	4842	68	4.287e-11	1.028	4785	59	4811	63
HR5914	4.00	-0.37	3.900e-09	0.00	1.197e-10	1.012	5769	114	6.530e-11	1.020	5789	69	2.430e-11	1.017	5761	76	5774	82
HR5933	4.00	-0.32	7.590e-09	0.00	2.013e-10	1.012	6221	159	—	—	—	—	3.767e-11	1.014	6238	77	6233	104
G016-025	4.50	-2.73	1.540e-12	0.03	5.052e-14	1.008	5364	177	2.666e-14	1.025	5579	71	1.051e-14	1.020	5479	73	5502	90
G240-002	4.50	-0.78	3.597e-10	0.00	1.155e-11	1.010	5576	151	6.616e-12	1.024	5560	76	2.470e-12	1.018	5541	68	5555	87
HR5968	4.00	-0.17	1.871e-09	0.00	5.752e-11	1.013	5794	117	3.150e-11	1.020	5793	71	1.177e-11	1.016	5753	64	5777	78
HD143921	4.50	-2.48	4.397e-11	0.03	1.565e-12	1.008	5124	135	8.747e-13	1.027	5274	91	3.405e-13	1.020	5229	73	5235	94
HR5986	4.00	0.23	6.497e-09	0.00	1.802e-10	1.014	6168	104	9.167e-11	1.013	6188	62	3.443e-11	1.011	6126	57	6158	69
G016-028	4.50	-1.63	4.580e-12	0.03	1.650e-13	1.009	5143	113	9.772e-14	1.030	5184	72	3.828e-14	1.020	5114	63	5146	78
G180-024	4.50	-1.67	3.248e-11	0.00	8.690e-13	1.009	6038	160	4.597e-13	1.019	6062	119	1.689e-13	1.017	6072	114	6059	128
HD144515	4.50	-0.61	1.645e-10	0.00	6.302e-12	1.011	[4940]	128	4.275e-12	1.038	4910	68	1.672e-12	1.022	4829	60	4867	64
G225-057	5.00	-1.50	2.405e-10	0.00	1.390e-11	—	<3500	—	1.175e-11	—	<3500	—	4.396e-12	1.029	3578	143	(3578)	—
G168-042	4.50	-1.46	7.903e-12	0.01	2.986e-13	1.009	5015	187	1.782e-13	1.032	5092	95	6.885e-14	1.020	5050	78	5059	105
HR6136	5.00	0.00	3.923e-09	0.00	2.102e-10	1.012	[3804]	188	1.921e-10	—	<3500	—	6.795e-11	1.034	3862	105	(3862)	—
G180-058	4.50	-2.32	9.375e-12	0.00	3.307e-13	1.008	5162	99	1.938e-13	1.028	5197	79	7.547e-14	1.020	5153	48	5168	69
G017-021	5.00	-0.75	3.387e-10	0.00	1.001e-11	1.010	5834	99	5.405e-12	1.020	5855	60	1.990e-12	1.017	5857	47	5851	62
HD149144	4.50	-1.79	2.566e-11	0.00	8.438e-13	1.008	5408	149	4.961e-13	1.026	5365	74	1.893e-13	1.020	5344	66	5364	85
G017-025	5.00	-1.34	4.561e-11	0.00	1.784e-12	1.009	[4904]	86	1.096e-12	1.034	4979	49	4.199e-13	1.021	4955	43	4966	46
HR6189	4.00	-0.63	7.847e-10	0.00	2.169e-11	1.011	6046	129	1.150e-11	1.017	6046	77	4.269e-12	1.016	6028	65	6038	83
HR6228(5)	4.50	0.00	4.097e-09	0.00	1.681e-10	1.014	(4879)	101	1.400e-10	1.054	4476	62	5.697e-11	1.031	4323	53	4394	57
G017-037(6)	4.50	-2.29	1.276e-12	0.00	5.957e-14	1.010	(4201)	209	3.697e-14	1.036	4440	98	1.283e-14	1.020	4721	60	4614	74
HD152156	4.50	-1.70	5.618e-11	0.13	2.007e-12	1.009	5163	100	1.113e-12	1.027	5329	89	4.173e-13	1.020	5339	63	5289	81
HD153147	4.50	-1.26	5.576e-11	0.07	1.789e-12	1.009	5530	150	9.780e-13	1.024	5614	76	3.558e-13	1.019	5660	68	5622	87
G169-038	5.00	-1.50	1.440e-10	0.00	7.509e-12	1.011	[3731]	233	6.439e-12	—	<3500	—	2.434e-12	1.027	3717	125	(3717)	—
G019-013	4.50	0.00	3.867e-10	0.00	1.886e-11	1.011	[4217]	102	1.434e-11	1.059	4327	61	5.442e-12	1.031	4304	45	4314	52
HD156026	5.00	-0.23	1.267e-09	0.00	6.158e-11	1.011	[4187]	172	4.539e-11	1.057	4343	42	1.709e-11	1.029	4347	36	4345	39
HR6269	4.00	0.00	1.240e-09	0.00	4.167e-11	1.014	5543	150	2.324e-11	1.023	5562	76	8.834e-12	1.019	5508	68	5535	87
HD157089	4.00	-0.58	4.420e-10	0.00	1.417e-11	1.011	5599	82	7.670e-12	1.022	5685	78	2.832e-12	1.018	5684	47	5662	65
G181-045	4.50	-0.94	3.609e-12	0.01	1.269e-13	1.010	5279	120	7.694e-14	1.030	5257	62	2.877e-14	1.020	5248	57	5258	71
G182-007	4.50	-0.19	1.756e-10	0.00	6.508e-12	1.013	5204	108	3.978e-12	1.031	5193	47	1.513e-12	1.022	5143	48	5175	58
G019-024	4.50	0.40	5.758e-10	0.00	3.129e-11	1.012	[3939]	115	2.505e-11	1.068	4057	124	9.468e-12	1.037	4068	51	4065	72
G019-025	4.50	-1.52	6.878e-12	0.02	2.615e-13	1.009	[4990]	108	1.612e-13	1.033	5013	71	6.356e-14	1.020	4939	61	4977	75
G181-046	4.50	-0.76	3.951e-11	0.01	1.411e-12	1.011	5258	120	8.047e-13	1.028	5355	52	2.998e-13	1.020	5347	54	5334	65
G181-047	4.50	-0.68	1.115e-10	0.00	3.332e-12	1.011	5801	178	1.818e-12	1.021	5810	95	6.808e-13	1.017	5781	62	5794	93
HR6538	4.00	0.00	6.433e-10	0.00	2.017e-11	1.013	5761	153	1.081e-11	1.019	5788	79	4.036e-12	1.016	5758	71	5770	90
G139-043	5.00	0.00	1.615e-10	0.00	8.852e-12	1.012	[3702]	235	7.662e-12	—	<3500	—	2.891e-12	1.033	3708	127	(3708)	—
G019-027	4.50	-0.59	1.588e-10	0.00	5.539e-12	1.011	5340	80	3.114e-12	1.026	5444	75	1.150e-12	1.019	5446	45	5418	62
HR6556	4.00	0.00	3.710e-08	0.00	5.736e-10	1.001	7958	197	2.499e-10	0.993	7941	132	9.079e-11	0.993	7900	110	7923	138
G170-056	4.50	-1.25	3.493e-11	0.00	9.733e-13	1.009	5948	81	5.250e-13	1.020	5949	52	1.931e-13	1.017	5960	68	5952	65
G020-008	5.00	-2.59	3.126e-11	0.01	8.698e-13	1.008	5866	83	4.714e-13	1.021	5886	68	1.722e-13	1.018	5920	75	5891	75
G182-019	4.50	-0.71	1.246e-10	0.00	3.815e-12	1.011	5732	153	2.064e-12	1.021	5777	88	7.583e-13	1.017	5785	71	5771	94
G020-015	4.50	-2.79	2.319e-11	0.10	7.038e-13	1.008	5599	136	3.852e-13	1.024	5671	58	1.407e-13	1.019	5717	44	5682	63
G154-021	4.50	-2.29	4.886e-11	0.05	1.769e-12	1.008	5083	89	1.034e-12	1.028	5146	48	3.870e-13	1.020	5188	64	5145	63
HD161903	4.00	0.00	2.306e-10	0.00	3.994e-12	1.006	7580	169	1.823e-12	1.000	7513	97	6.597e-13	0.999	7497	93	7521	111
HD162208	4.00	0.00	2.521e-10	0.00	3.780e-12	1.003	8033	170	1.690e-12	0.998	7932	101	6.019e-13	0.996	7941	98	7953	115
HR6628	4.00	0.00	2.988e-09	0.00	3.780e-11	0.997	8588	137	1.443e-11	0.989	8845	109	5.161e-12	0.987	8828	107	8794	116

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G183-011	4.50	-2.05	3.701e-11	0.00	8.345e-13	1.009	6546	97	4.439e-13	1.014	6438	68	1.667e-13	1.015	6370	69	6441	76
G154-034	4.50	0.00	9.956e-12	0.05	3.406e-13	1.014	5486	102	1.938e-13	1.024	5501	75	7.342e-14	1.019	5442	45	5469	66
G154-036	4.50	-1.50	4.119e-11	0.02	1.371e-12	1.009	5392	157	7.548e-13	1.025	5505	100	2.771e-13	1.019	5542	94	5493	111
HR6752	4.50	-0.17	7.908e-09	0.00	3.144e-10	1.013	[4990]	69	1.980e-10	1.036	5023	70	7.623e-11	1.023	4951	41	4978	52
G020-024	4.50	-0.91	1.387e-11	0.12	3.289e-13	1.010	6486	113	1.726e-13	1.014	6398	64	5.971e-14	1.012	6523	70	6464	77
HR6806	4.50	-0.25	8.975e-10	0.00	3.677e-11	1.013	4866	108	2.312e-11	1.037	4964	78	8.719e-12	1.022	4931	70	4947	74
G140-046	4.50	-1.44	2.171e-11	0.00	8.540e-13	1.009	4876	79	5.225e-13	1.034	4972	57	1.964e-13	1.021	4986	42	4980	48
G021-006(7)	4.50	0.00	4.098e-12	0.00	2.020e-13	1.011	(4161)	154	1.196e-13	1.043	4749	67	4.507e-14	1.027	4723	58	4735	62
HR6844	4.00	0.17	5.657e-10	0.00	1.177e-11	1.009	7056	133	5.562e-12	1.004	7027	69	2.003e-12	1.003	7039	65	7038	80
GJ710	5.00	0.00	8.105e-11	0.00	4.241e-12	1.012	[3882]	218	3.780e-12	1.055	[3500]	300	1.331e-12	1.032	3886	102	(3886)	—
HR6847	4.00	0.00	8.246e-10	0.00	2.539e-11	1.013	5807	154	1.383e-11	1.019	5791	79	5.166e-12	1.016	5761	71	5781	90
G184-004	4.50	-0.40	1.565e-12	0.10	6.586e-14	1.012	[4755]	94	3.673e-14	1.033	5110	71	1.399e-14	1.022	5065	63	5086	67
G141-019	4.50	-2.39	2.174e-11	0.05	7.795e-13	1.008	5107	110	4.617e-13	1.028	5130	71	1.738e-13	1.020	5164	64	5138	77
HD171620	4.50	-0.65	2.563e-10	0.00	6.960e-12	1.011	6097	126	3.629e-12	1.016	6113	82	1.336e-12	1.015	6111	68	6109	86
G206-034	5.00	-3.10	8.165e-12	0.04	2.137e-13	1.013	6305	223	1.163e-13	1.014	6143	82	4.158e-14	1.012	6199	92	6191	109
G227-037	4.00	0.27	1.576e-10	0.00	4.802e-12	1.015	5885	124	2.604e-12	1.017	5842	59	9.702e-13	1.015	5809	48	5835	65
BD +20 3876	4.00	-0.45	5.247e-11	0.00	1.750e-12	1.011	5509	150	9.839e-13	1.024	5550	76	3.669e-13	1.018	5525	68	5531	87
G021-022	4.50	-1.63	1.419e-11	0.00	3.965e-13	1.009	5906	180	2.211e-13	1.021	5847	69	8.092e-14	1.018	5876	60	5869	82
G184-020	4.50	-2.11	3.593e-12	0.10	1.108e-13	1.008	5577	124	6.282e-14	1.024	5582	105	2.294e-14	1.019	5625	134	5593	120
G021-024	5.00	-1.50	1.602e-10	0.00	8.238e-12	1.011	[3793]	227	6.958e-12	1.055	[3518]	300	2.427e-12	1.025	3915	97	(3915)	—
G184-029	5.00	-1.50	1.190e-10	0.00	6.419e-12	1.011	[3504]	253	5.518e-12	—	<3500	—	1.967e-12	1.026	3760	120	(3760)	—
G022-009	4.50	-0.48	2.615e-11	0.00	9.025e-13	1.012	5386	80	5.024e-13	1.025	5497	76	1.847e-13	1.019	5503	68	5465	74
HR7236	4.00	0.00	8.965e-09	0.00	1.083e-10	1.001	8715	171	4.141e-11	0.996	8981	110	1.496e-11	0.995	8927	108	8910	124
HR7260	4.00	0.00	1.031e-09	0.00	3.406e-11	1.014	5591	142	1.875e-11	1.022	5629	67	7.066e-12	1.018	5583	67	5603	81
G022-020	4.50	-1.21	5.932e-11	0.00	1.929e-12	1.009	5498	102	1.045e-12	1.024	5608	52	3.805e-13	1.019	5651	71	5597	70
HD181007	4.50	-2.27	5.022e-11	0.00	2.075e-12	1.009	[4651]	127	1.373e-12	1.033	4533	64	5.230e-13	1.021	4625	57	4582	60
G125-004	4.50	-0.42	9.168e-11	0.00	3.623e-12	1.012	[4965]	276	2.230e-12	1.035	5045	131	8.634e-13	1.023	4975	149	5004	139
G022-024	4.50	-0.47	2.074e-11	0.00	9.407e-13	1.011	[4460]	74	6.184e-13	1.045	4675	66	2.205e-13	1.025	4715	39	4700	49
HR7373	4.00	0.41	2.368e-09	0.00	8.384e-11	1.017	5459	81	4.552e-11	1.023	5552	51	1.698e-11	1.017	5521	68	5518	64
HR7386	4.00	0.24	8.744e-10	0.00	2.544e-11	1.014	6030	125	1.296e-11	1.014	6072	84	4.741e-12	1.013	6074	90	6062	97
G125-013	4.50	-0.87	2.304e-11	0.00	6.678e-13	1.010	5875	170	3.579e-13	1.020	5901	82	1.321e-13	1.017	5901	96	5896	105
G092-008	5.00	-1.50	4.473e-11	0.00	2.553e-12	—	<3500	—	2.147e-12	—	<3500	—	8.071e-13	1.028	3599	141	(3599)	—
HD338529	4.50	-2.58	5.255e-11	0.00	1.258e-12	1.008	6341	160	6.663e-13	1.016	6298	74	2.427e-13	1.016	6309	58	6310	81
G208-029	4.00	0.00	1.021e-10	0.00	2.445e-12	1.012	6582	292	1.214e-12	1.009	6550	174	4.433e-13	1.010	6553	182	6559	205
HD184499	4.00	-0.69	6.206e-10	0.00	1.891e-11	1.011	5748	116	1.036e-11	1.022	5759	59	3.855e-12	1.018	5745	44	5750	62
G023-005	5.00	-1.50	1.121e-10	0.00	6.130e-12	—	<3500	—	5.321e-12	—	<3500	—	1.914e-12	1.027	3697	128	(3697)	—
HR7462	4.50	-0.25	4.012e-09	0.00	1.437e-10	1.013	5303	147	—	—	—	—	3.389e-11	1.022	5177	64	5227	89
HR7503	4.30	0.14	1.115e-09	0.00	3.466e-11	1.014	5803	154	1.893e-11	1.019	5780	78	7.122e-12	1.016	5730	71	5763	90
HR7504	4.50	0.08	8.960e-10	0.00	2.766e-11	1.014	5814	154	1.522e-11	1.019	5780	78	5.714e-12	1.016	5733	71	5767	90
G125-031	5.00	-1.00	1.455e-10	0.00	7.431e-12	1.011	[3846]	222	6.471e-12	—	<3500	—	2.415e-12	1.028	3766	119	(3766)	—
HD188262	4.50	0.00	3.125e-10	0.00	1.281e-11	1.014	[4882]	143	8.299e-12	1.038	4906	70	3.277e-12	1.026	4802	61	4850	65
HD188510	4.00	-1.80	8.512e-11	0.00	2.627e-12	1.008	5595	166	1.526e-12	1.026	5544	78	5.604e-13	1.019	5575	169	5564	121
G023-020	4.50	-1.83	7.187e-12	0.00	2.488e-13	1.008	5260	205	1.470e-13	1.028	5257	112	5.416e-14	1.020	5306	100	5278	126
HD189558	4.00	-1.30	2.306e-10	0.00	6.878e-12	1.009	5744	147	3.993e-12	1.024	5639	92	1.480e-12	1.019	5645	59	5663	87
G092-049	5.00	0.00	5.322e-12	0.00	2.815e-13	1.011	[3854]	177	1.717e-13	1.050	4570	191	6.777e-14	1.030	4477	109	4511	139
HR7670	4.00	0.26	1.431e-09	0.00	4.758e-11	1.015	5621	121	2.705e-11	1.022	5579	76	1.013e-11	1.017	5539	68	5572	83
G186-011	4.50	-0.18	3.929e-10	0.00	1.519e-11	1.013	5066	108	9.926e-12	1.036	4995	69	3.737e-12	1.024	4970	61	5001	75
G024-003	4.50	-1.78	1.901e-11	0.00	5.393e-13	1.008	5850	195	2.932e-13	1.021	5859	66	1.088e-13	1.018	5863	74	5859	89
HD227638	5.00	-0.87	9.290e-11	0.00	3.511e-12	1.010	5060	172	2.294e-12	1.035	4986	64	8.780e-13	1.021	4944	58	4984	78
GJ782	5.00	-1.50	1.477e-10	0.00	7.653e-12	1.011	[3762]	230	6.395e-12	1.055	[3523]	300	2.255e-12	1.025	3900	99	(3900)	—
HD345957	4.50	-1.45	8.043e-11	0.00	2.256e-12	1.009	5905	84	1.322e-12	1.022	5743	68	4.901e-13	1.018	5750	52	5788	65
GJ784	5.00	-1.50	4.579e-10	0.00	2.673e-11	—	<3500	—	2.195e-11	—	<3500	—	8.455e-12	1.029	3562	145	(3562)	—
G024-013	4.50	-1.10	2.534e-11	0.00	8.193e-13	1.009	5523	120	4.561e-13	1.025	5572	51	1.708e-13	1.019	5558	70	5558	71
HD193901	4.50	-1.13	9.745e-11	0.00	2.878e-12	1.010	5790	154	1.618e-12	1.022	5746	78	6.035e-13	1.018	5735	71	5750	90
G186-026	4.50	-3.40	1.401e-11	0.01	3.352e-13	1.008	6327	128	1.638e-13	1.014	6487	87	6.092e-14	1.015	6438	79	6428	94
HD229274	4.50	-2.46	7.292e-11	0.00	2.288e-12	1.008	5510	420	1.384e-12	1.026	5378	193	5.162e-13	1.020	5404	210	5414	243
GJ798	5.00	-1.50	1.732e-10	0.00	9.278e-12	1.011	[3540]	250	7.923e-12	—	<3500	—	2.816e-12	1.026	3786	116	(3786)	—
BD +4 4551	4.50	-1.80	4.144e-11	0.00	1.178e-12	1.008	5842	154	6.473e-13	1.021	5829	79	2.445e-13	1.018	5799	72	5819	91
G024-015	4.00	-1.37	1.294e-10	0.00	3.511e-12	1.009	6023	125	1.886e-12	1.019	6012	55	6.945e-13	1.017	6019	74	6017	76
HR7914	4.00	0.00	7.128e-10	0.00	2.215e-11	1.013	5781	154	1.211e-11	1.020	5768	78	4.504e-12	1.017	5745	71	5761	90

Table 4. continued

ID	log(g)	[Fe/H]	F_{Bol}	E(B-V)	F_J	q_J	T_J	ΔT_J	F_H	q_H	T_H	ΔT_H	F_K	q_K	T_K	ΔT_K	T_{mean}	ΔT_{mean}
G231-019	5.00	-1.50	3.455e-10	0.00	1.867e-11	—	<3500	—	1.636e-11	—	<3500	—	6.120e-12	1.028	3630	137	(3630)	—
G209-041	5.00	0.00	6.271e-11	0.00	3.292e-12	1.011	[3885]	126	2.588e-12	1.066	4080	73	1.029e-12	1.033	4005	64	4043	81
HR7994	4.00	0.00	7.678e-10	0.00	2.413e-11	1.013	5749	153	1.347e-11	1.021	5698	77	5.081e-12	1.018	5647	70	5686	89
G210-046	4.00	0.09	6.305e-10	0.00	1.877e-11	1.014	5927	143	1.021e-11	1.018	5875	85	3.810e-12	1.015	5839	67	5870	89
G025-015	4.50	-0.48	3.270e-10	0.00	9.859e-12	1.011	5799	102	5.538e-12	1.021	5751	59	2.073e-12	1.017	5714	56	5747	67
HR8085	4.50	-0.05	3.715e-09	0.00	1.740e-10	1.012	[4372]	99	1.335e-10	1.056	4319	56	5.042e-11	1.029	4327	45	4323	50
HR8086	5.00	-0.18	2.220e-09	0.00	1.173e-10	1.012	[3810]	180	1.037e-10	—	<3500	—	3.630e-11	1.032	3865	97	(3865)	—
G067-037	5.00	-1.50	4.091e-10	0.00	2.066e-11	1.011	[3876]	219	1.799e-11	—	<3500	—	6.763e-12	1.026	3759	120	(3759)	—
GJ820B	5.00	-1.50	2.241e-09	0.00	1.168e-10	1.011	[3726]	233	1.015e-10	—	<3500	—	3.645e-11	1.026	3786	116	(3786)	—
HD201891	4.50	-1.22	3.162e-10	0.00	8.942e-12	1.009	5905	127	4.845e-12	1.020	5905	68	1.786e-12	1.017	5914	49	5909	70
HD201889	4.00	-1.10	1.727e-10	0.00	5.300e-12	1.010	5670	137	3.001e-12	1.024	5643	71	1.133e-12	1.019	5609	69	5635	84
GJ825	5.00	-1.50	1.422e-09	0.00	8.148e-11	—	<3500	—	7.106e-11	—	<3500	—	2.576e-11	1.028	3592	142	(3592)	—
BD +04 4674	4.50	-0.90	1.118e-10	0.00	3.271e-12	1.010	5842	154	1.857e-12	1.021	5762	78	6.926e-13	1.018	5747	71	5771	90
G025-029	4.50	-0.90	1.118e-10	0.00	3.271e-12	1.010	5842	154	1.857e-12	1.021	5762	78	6.926e-13	1.018	5747	71	5771	90
G026-009	4.50	-1.27	4.845e-11	0.00	2.339e-12	1.010	[4095]	143	1.740e-12	1.051	4078	88	6.389e-13	1.024	4299	36	4235	51
G026-012	4.50	-2.64	4.490e-12	0.04	1.107e-13	1.008	6245	127	6.107e-14	1.018	6127	82	2.171e-14	1.016	6204	77	6185	91
G126-019	4.50	-0.20	4.728e-11	0.00	1.681e-12	1.013	5333	136	1.026e-12	1.029	5277	64	3.915e-13	1.021	5220	72	5267	81
G214-001	4.50	-2.06	4.854e-12	0.04	1.368e-13	1.008	5849	124	7.681e-14	1.022	5797	79	2.921e-14	1.018	5754	71	5792	86
G188-029	4.50	-0.05	6.413e-11	0.03	1.756e-12	1.013	6160	152	9.058e-13	1.014	6160	99	3.324e-13	1.013	6157	65	6159	94
G215-020	5.00	-1.50	4.695e-11	0.00	2.624e-12	—	<3500	—	2.241e-12	—	<3500	—	8.294e-13	1.028	3635	136	(3635)	—
G188-030	4.50	-1.99	1.266e-11	0.01	4.340e-13	1.008	5273	135	2.542e-13	1.027	5276	55	9.793e-14	1.020	5251	49	5264	65
G018-016	5.00	-1.50	1.605e-10	0.00	9.017e-12	—	<3500	—	7.809e-12	—	<3500	—	2.931e-12	1.029	3580	143	(3580)	—
G018-028	4.50	-0.84	4.469e-11	0.00	1.491e-12	1.010	5448	119	8.820e-13	1.027	5410	74	3.301e-13	1.019	5391	67	5411	81
HR8455	4.50	-0.53	9.753e-10	0.00	3.390e-11	1.011	5357	118	2.160e-11	1.031	5213	68	7.414e-12	1.020	5356	59	5304	75
G126-062	4.50	-1.80	4.695e-11	0.00	1.277e-12	1.009	5979	125	7.017e-13	1.020	5930	100	2.612e-13	1.018	5923	97	5941	106
G126-063(8)	4.50	-1.49	4.005e-12	0.00	1.519e-13	1.009	(5003)	104	6.626e-14	1.023	5725	79	2.457e-14	1.018	5733	71	5730	83
HD211476	4.50	0.05	4.137e-10	0.00	1.234e-11	1.014	5912	84	6.729e-12	1.018	5864	79	2.506e-12	1.015	5832	49	5862	67
HR8541	4.00	0.00	3.751e-09	0.00	5.658e-11	1.000	8033	123	2.352e-11	0.992	8120	67	8.460e-12	0.989	8092	87	8092	87
G018-039	4.50	-1.34	2.000e-11	0.00	5.383e-13	1.009	6046	157	2.977e-13	1.020	5965	80	1.106e-13	1.017	5954	73	5976	92
G018-054	4.50	-1.52	1.508e-11	0.00	4.461e-13	1.009	5748	123	2.428e-13	1.022	5782	79	9.169e-14	1.018	5752	71	5762	86
G027-036	5.00	-1.50	7.287e-11	0.00	4.280e-12	—	<3500	—	3.442e-12	—	<3500	—	1.339e-12	1.029	3570	144	(3570)	—
HR8585	4.00	0.00	7.944e-09	0.00	9.312e-11	1.001	8811	171	3.655e-11	0.996	8994	110	1.348e-11	0.995	8878	108	8906	124
G067-008	4.50	-0.09	4.598e-11	0.00	1.665e-12	1.014	5293	117	9.947e-13	1.029	5288	73	3.762e-13	1.021	5248	65	5273	80
G027-044	4.50	-0.90	3.063e-10	0.00	9.503e-12	1.010	5664	152	5.116e-12	1.022	5746	121	1.889e-12	1.018	5752	73	5730	105
G156-065	4.50	-0.42	1.753e-10	0.00	5.668e-12	1.012	5595	145	3.197e-12	1.023	5599	65	1.186e-12	1.018	5585	59	5592	76
GJ884	5.00	-1.50	4.288e-10	0.00	2.330e-11	—	<3500	—	2.001e-11	—	<3500	—	7.142e-12	1.027	3746	121	3746	121
G028-043	4.50	-1.75	3.349e-11	0.00	1.255e-12	1.008	5016	140	7.513e-13	1.031	5073	76	2.843e-13	1.020	5078	97	5061	98
HR8832	4.50	0.00	2.044e-09	0.00	8.690e-11	1.013	[4765]	133	—	—	—	—	2.166e-11	1.026	4785	59	4785	—
G190-015	5.00	-3.00	1.240e-11	0.01	4.461e-13	1.008	5074	175	2.602e-13	1.028	5131	73	1.007e-13	1.020	5116	76	5115	92
G273-001	5.00	-1.63	1.537e-10	0.00	4.299e-12	1.009	5907	131	2.176e-12	1.019	6063	80	8.277e-13	1.017	6003	74	6012	89
G216-037	5.00	0.00	3.632e-11	0.00	2.002e-12	1.012	[3693]	116	1.799e-12	—	<3500	—	6.534e-13	1.032	3775	92	(3775)	—
G029-023	4.50	-2.02	2.387e-11	0.00	6.158e-13	1.009	6126	126	3.265e-13	1.018	6129	82	1.241e-13	1.017	6062	75	6102	90
G217-007	5.00	0.00	1.061e-10	0.00	5.513e-12	1.011	3930	248	4.814e-12	1.063	[3681]	300	1.807e-12	1.034	3907	130	3980	130
HR8905	4.00	-0.12	4.612e-09	0.00	1.335e-10	1.013	5982	156	...	—	—	—	2.637e-11	1.016	5941	73	5954	99
G217-008(9)	4.50	-1.91	1.817e-11	0.01	3.994e-13	1.008	(6645)	130	2.432e-13	1.018	6183	82	9.323e-14	1.017	6091	75	6134	70
G273-068	5.00	0.00	1.867e-10	0.00	9.914e-12	1.012	[3824]	224	7.452e-12	1.057	[3940]	300	2.799e-12	1.030	4101	72	4101	—
G029-043	5.00	0.00	4.606e-11	0.00	2.497e-12	1.012	[3762]	184	1.888e-12	1.066	4096	113	7.527e-13	1.033	4012	83	4048	96
G190-034	4.50	-0.01	7.043e-11	0.00	2.537e-12	1.014	5320	147	1.484e-12	1.027	5341	92	5.598e-13	1.021	5301	65	5318	91
G029-047	5.00	0.00	9.468e-11	0.00	5.146e-12	1.012	[3754]	189	4.540e-12	—	<3500	—	1.698e-12	1.035	3781	99	(3781)	—
HD221950	4.50	-0.70	1.426e-09	0.00	3.527e-11	1.010	6370	160	1.864e-11	1.014	6297	84	6.827e-12	1.014	6296	78	6311	97
HD222589	4.00	0.02	9.688e-11	0.00	3.580e-12	1.014	5248	146	2.233e-12	1.032	5181	71	8.440e-13	1.021	5135	63	5174	82
G157-093	4.50	-0.90	2.612e-11	0.00	8.739e-13	1.010	5443	119	5.026e-13	1.026	5459	75	1.899e-13	1.019	5422	67	5440	82
G158-020	4.50	-0.59	1.201e-10	0.00	3.463e-12	1.011	5919	127	1.926e-12	1.020	5849	67	7.139e-13	1.017	5837	72	5859	82
LTT6059	4.00	0.00	7.738e-12	0.00	2.407e-13	1.014	5779	123	1.474e-13	1.023	5541	75	5.630e-14	1.019	5470	68	5566	83
BD -16 418	4.50	0.00	1.429e-11	0.00	5.774e-13	1.014	[4935]	128	3.688e-13	1.037	4975	69	1.445e-13	1.024	4867	60	4917	64
G251-054	4.50	-1.73	2.841E-11	0.00	9.877E-13	1.008	5255	146	5.657E-13	1.027	5309	73	2.115E-13	1.020	5330	66	5308	84

NOTES TO TABLE 4:

(1)SB501: Wrong F_J, (J=11.22).
(2)G036-050: The error in F_J is greater than 10 %, hence no T_J is provided.
(3)G178-030: Very faint star, J=11.63, H=11.31 and K=11.127.
(4)G167-011: The error in F_J is greater than 20 %. The faintest star of the sample (J=12.99).
(5)HR6228: Wrong F_J.
(6)G017-037: Very faint star, J=11.706, H=11.300 and K=11.297.
(7)G021-006: Wrong F_J, (J=10.38).
(8)G126-063: Faint star, J=10.69, H=10.64 and K=10.59.
(9)G217-008: Wrong F_J.