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THE SOUTHERN VILNIUS PHOTOMETRIC SYSTEM. III. OBSERVATIONS OF E AND F HARVARD STANDARD REGIONS, 47 TUC AND SOME METAL-DEFICIENT STARS

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Abstract. The results of photoelectric photometry in the Vilnius system of 101 southern stars in the areas E1–E4, E8, E9 and F1 as well as of some metal deficient stars are presented. Photometrically determined spectral types and luminosity classes of these stars are also given.

Key words: stars: multicolor photometry, standards – methods: observational – techniques: photometric

1. Introduction

By 1993, more than 7000 stars had been observed in the Vilnius seven color photometric system (Straižys and Kazlauskas, 1993). Most of them are Northern hemisphere stars. Recently, some papers with Vilnius photometry in the Southern hemisphere were published (Forbes, Dodd and Sullivan 1993, 1994; Zdanavičius, Claria, Piatti and Straižys 1994; Straižys, Claria, Piatti and Kazlauskas 1994). Here we present new observations in the Vilnius photometric system in E and F Harvard Standard Regions obtained at the Mt. John Observatory in New Zealand. In addition, some metal deficient stars in the galactic field and some stars in the globular clusters NGC 2796 and 47 Tuc have been observed. The stars, measured three or more times, may be considered as the Vilnius system standards in the southern sky.

2. Observations

The observations were made at Mt. John Observatory of Canterbury University on Mt. John in the South Island of New Zealand from October to December, 1994. The photometer was used on the 61-cm telescope with a thermoelectrically cooled EMI 9202 B photomultiplier tube. The photometer was working in the pulse counting mode, the integrated counts being logged by a computer. The filters used are very close to the standard filters of the Vilnius system. Their spectral transmittance curves are presented in Forbes, Dodd and Sullivan (1993). Usually, a 32″ aperture was used. The sky background was usually measured after the observation of a star; in the case of the faintest stars, the sky was measured both before and after the star observation. A typical star observation consisted of three measurements per filter, the filter sequence being U, P, X, Y, Z, V, S. Ten seconds integration times were used for the U and P filters and five seconds for the remaining ones. Two such consecutive observations for the bright stars, and three or four observations for the fainter stars were made each night.

In October and November, HD 1388 ($\alpha(2000) = 0^h17^m57^s$, $\delta(2000) = -13°27'21''$, $V = 6.48$ mag, G0 V) was used as an extinction star. It was observed at 1.5–2 hour intervals. Its extra-atmospheric instrumental magnitude and color indices were determined by Nikonov's method using HD 27019 (No. 44 from E2 region, $\alpha(2000) = 4^h14^m08^s$, $\delta(2000) = -46°07'51''$, $V = 6.78$ mag, F8/G0 V) as a control star. The control star was observed during 5 nights, 3–5 times every night. More than 20 stars in Cetus and some blue stars in Orion from Straižys and Kazlauskas (1993) were observed as the standard stars to determine color equations for transformation to the standard system. The latter stars served as the secondary standards of the Vilnius system and are named CV in Table 1. In December, local comparison stars were observed in every region (E136, E244, E347, E445, E844 and F101).

3. Reductions

The count rates were corrected for the dead time of the photon counter ($\tau = 370$ ns). Then the sky background was subtracted, and raw observed magnitudes and color indices were calculated. The approximate extra-atmospheric magnitude and color indices for the extinction star were determined by the Bouguer method from the observations made during the best nights. These values then were corrected by Nikonov's method using observations of the control star. The extra-atmospheric values of the magnitude and color indices obtained were used to determine the instant extinction values of the atmosphere, α_e. The atmospheric extinction values for observations of the program stars were determined by interpolating in the time scale between the nearest observations of the extinction star. After that, the extinction values α_e obtained were corrected for the differences of spectral types and interstellar reddenings between the program star and the extinction star. For the magnitudes (and color indices) with $\lambda > 400$ nm, these corrections are small and depend linearly on the color index. The corrections for ultraviolet color indices are obtained by iterations using the equations from Zdanavičius (1975):

$$\alpha_{*(P-X)} = \alpha_{e(P-X)} - 0.036\,\Delta Q_{PXYV} + 0.041\,\Delta Q_{XYV}$$

and

$$\alpha_{*(U-P)} = (\alpha_{e(U-P)} - 0.038\,\Delta Q_{UPX} - 0.016\,\Delta Q_{XYV} + \\ + 0.036\,\Delta Q_{ZVYV})(1 - 0.125\,\Delta(X-Y)).$$

The obtained extra-atmospheric values of color indices in the instrumental system of the program stars were transformed to the standard Vilnius system. For color indices in the visible spectral region, equations of the following type were used:

$$C_i\,(\text{stand. system}) = a_0 + a_1\,C_i\,(\text{instr. system}).$$

For color indices including an ultraviolet magnitude, the equations have the following form:

$$P - V = b_0 + b_1\,C_{P-V} + b_2\,Q_{XYV} + b_3\,Q_{UPX},$$

$$U - V = f_0 + f_1\,C_{U-V} + f_2\,Q_{XYV} + f_3\,Q_{UPYV}.$$

The values of the coefficients were calculated by a least square fitting using the observed standard stars.

In these equations the terms with the Q-parameters give additional corrections for differences of the luminosity classes. Usually they are most significant for transformations of the supergiant stars.

For a purpose of control, the same observational data have been reduced by the method described in the paper by Forbes, Dodd and Sullivan (1993). The mean differences between the colors obtained by the two methods, do not exceed 0.01 mag (except $U-V$, for which it is 0.03 mag). The standard deviations from these mean values are $\pm(0.02-0.03)$ mag. The worst agreement is found for the December observations. During this time, the sky quality was the poorest. Besides, the second method uses mean extinction values.

During the reductions, it was noticed that photometer readings depended on the position of the telescope: the count increases by about 2 % with an increase of hour angle by 1 h. This was found to happen between -3 h and $+3$ h hour angles. Later on, this instability was confirmed by special tests in day time, made by A. Gilmore. Fortunately, this effect has no influence on the color indices. Although the magnitude V has been corrected, it was of somewhat lower accuracy.

The December observations were reduced by the differential method in each region using the local extinction star as a comparison star. This procedure decreased the errors, which could originate due to a possible instability of both the atmospheric extinction and the instrumental system.

4. Catalogue

Table 1 lists the magnitudes and color indices of the observed stars. The 1st column contains the field name and the star number in this field and the 2nd column contains HD number. The numbers of HSR stars are from Menzies et al. (1989), while the numbers of stars in the globular cluster 47 Tuc are from Alcaino and Liller (1985). NGC 2298-A can by found by its coordinates, as one of the brightest stars in the vicinity of the visible position of the globular cluster. The next two columns contain the equatorial coordinates. In the 5th column, V magnitudes are given. Because of the earlier mentioned instrumental instability, V magnitudes for the stars of E and F regions are taken from the Revised Catalogue of the $UBV(RI)_C$ Standard Stars (Menzies et al. 1989). The next six columns contain color indices of the Vilnius system, in a line below there are r.m.s. errors of the mean. If a star was observed only during one night, its error was calculated from the dispersion of separate readings. The column n gives a number of nights, when the star was observed. The next two columns give the spectral type, as classified from the photometric measurements and taken from the Michigan Catalogue (Houk and Cowley 1975; Houk 1979) or Jaschek (1978). For metal-deficient stars, no photometric classification is given. An exclamation mark after the photometric spectral type means that the mean difference between the dereddened color indices of this star and the intrinsic color indices of the standard star of the given spectral type is ≤ 0.005 mag. The colon means that this difference is > 0.035 mag. The final column gives the color excess resulting from the intrinsic colors determined from our classification.

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References

Alcaino G., Liller W. 1985, A&A. 146, 389

Forbes M.C., Dodd R.J., Sullivan D.J. 1993, Baltic Astronomy, 2, 246

Forbes M.C., Dodd R.J., Sullivan D.J. 1994, Baltic Astronomy, 3, 227

Houk N., Cowley A.P. 1975. Michigan Catalogue of Two-dimensional Spectral Types for the HD Stars, vol. 1

Houk N. 1978. Michigan Catalogue of Two-dimensional Spectral Types for the HD Stars, vol. 2

Jaschek M. 1978, Catalogue of Selected Spectral Types in the MK System (Magnetic Tape S 3042), Strasbourg Stellar Data Center

Menzies J.W., Cousins A.W.J., Banfield R.M., Laing J.D. 1989, Circ. South African AO, No. 13, 1

Straižys V., Kazlauskas A. 1993, Baltic Astronomy, 2, 1

Straižys V., Claria J.J., Piatti A.E., Kazlauskas A. 1994, Baltic Astronomy, 3, 199

Zdanavičius K. 1975, Bull. Vilnius Obs., No. 41, 3

Zdanavičius K., Claria J.J., Piatti A.E., Straižys V. 1994, Baltic Astronomy, 3, 217

Table 1. Results of photometry in the Vilnius system

Star	HD	α(2000)	δ(2000)	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
		h m s	° ′											
CV1	955	0 13 54	−17 32.6	7.34	0.799	0.601	0.222	0.103	0.030	0.075	5	B3.5 V	B5 III	0.05
				0.01	0.004	0.003	0.003	0.002	0.005	0.003				
CV2	1000	0 14 21	−21 11.6	6.91	2.225	1.744	1.146	0.480	0.174	0.469	4	F6 V !	F8 V	0.01
				0.01	0.005	0.004	0.004	0.004	0.003	0.003				
CV3	1256	0 16 42	−20 12.6	6.46	1.076	0.783	0.293	0.128	0.040	0.109	6	B6 V	B8 III	0.01
				0.01	0.003	0.003	0.003	0.002	0.003	0.004				
CV4	1388	0 17 57	−13 27.3	6.48	2.386	1.939	1.327	0.542	0.202	0.533	16	G0 V !	G0 V	0.02
				0.01	0.003	0.002	0.002	0.002	0.002	0.002				
CV5	1879	0 23 04	−15 56.6	6.47	5.590	4.694	3.247	1.175	0.549	1.122	3	M2 III	M2 III	0.03
				0.01	0.007	0.007	0.004	0.003	0.005	0.004				
CV10	3296	0 36 01	−05 33.8	6.73	2.146	1.681	1.095	0.460	0.157	0.448	3	F5 V	F5 V	0.00
				0.01	0.009	0.007	0.006	0.007	0.009	0.004				
CV15	4607	0 47 56	−09 20.9	7.73	2.245	1.760	1.177	0.497	0.174	0.487	2	F6 V	F7 V	0.03
				0.01	0.004	0.004	0.004	0.002	0.006	0.015				
CV17	4915	0 51 10	−05 02.1	6.97	2.480	2.057	1.427	0.572	0.228	0.568	1		G3 V-MD	
				0.01	0.010	0.015	0.011	0.010	0.007	0.010				
CV18	4928	0 51 18	+03 23.1	6.37	3.755	3.172	2.169	0.806	0.320	0.736	1	K0 III	K0 III	0.06
				0.01	0.016	0.019	0.013	0.009	0.010	0.010				
CV21	5112	0 53 00	−01 08.7	4.77	5.459	4.636	3.205	1.133	0.525	1.063	2	K4.5 III	M0 III	0.11
				0.01	0.028	0.008	0.006	0.002	0.004	0.004				
CV22	5268	0 54 17	−08 44.4	6.16	3.258	2.675	1.855	0.739	0.270	0.696	4		G8 III-MD	
				0.01	0.006	0.005	0.004	0.002	0.004	0.003				

Table 1 (continued)

Star	HD	α(2000) h m s	δ(2000) ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
CV24	5349	0 55 12	−16 58.2	7.91	3.661	3.129	2.051	0.742	0.348	0.734	1	K1.7 IV	K1 IV	0.00
				0.01	0.023	0.019	0.016	0.011	0.007	0.008				
CV28	5520	0 58 00	+00 27.1	8.35	2.085	1.585	0.959	0.412	0.154	0.379	1	F3 V	F2 V	0.00
				0.01	0.020	0.017	0.018	0.011	0.012	0.014				
CV31	5780	0 59 23	+00 46.8	7.65	5.117	4.296	2.915	1.057	0.504	1.001	3	K3.7 III	K5 II–III	0.09
				0.01	0.044	0.015	0.017	0.003	0.004	0.006				
CV40	15130	2 25 57	−12 17.4	4.89	1.831	1.178	0.401	0.167	0.041	0.132	1	A0 III	B9.5 Vn	0.00
				0.01	0.011	0.009	0.010	0.005	0.007	0.008				
CV44	35777	5 26 59	−02 21.6	6.58	0.676	0.534	0.228	0.099	0.032	0.072	1	B2.5 V	B2 V	0.08
				0.01	0.009	0.008	0.008	0.008	0.006	0.007				
CV45	35899	5 27 46	−02 08.7	7.43	0.871	0.658	0.265	0.118	0.037	0.097	1	B4 V	B5 V	0.05
				0.01	0.014	0.011	0.014	0.008	0.009	0.010				
CV46	35792	5 27 09	−01 22.0	7.16	0.846	0.638	0.245	0.113	0.040	0.090	1	B4 V	B3 V	0.04
				0.01	0.016	0.012	0.015	0.009	0.011	0.016				
CV47	35947	5 28 07	−01 40.1	7.28	2.258	1.788	1.186	0.500	0.183	0.478	1	F6 V	F8/G0 V	0.04
				0.01	0.008	0.009	0.005	0.006	0.003	0.006				
CV49	37699	5 40 25	−02 26.8	7.61	0.822	0.632	0.272	0.143	0.048	0.085	1	B3 V	B5	0.10
				0.01	0.011	0.009	0.011	0.010	0.005	0.011				
CV50	37744	5 40 37	−02 49.5	6.17	0.443	0.374	0.171	0.104	0.034	0.060	1	B1.5 III	B1.5 V	0.05
				0.01	0.010	0.007	0.009	0.006	0.006	0.007				
E104	8305	1 21 31	−45 08.3	7.45	2.121	1.607	0.964	0.405	0.138	0.386	3	F2 V	F2 V	0.00
				0.00	0.004	0.004	0.006	0.005	0.007	0.005				

Table 1 (continued)

Star	HD	α(2000)	δ(2000)	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
		h m s	° ′											
E130	7706	1 16 12	−42 00.6	6.58	4.336	3.674	2.466	0.887	0.384	0.827	3	K2 III	K2 III	0.03
				0.00	0.008	0.005	0.004	0.002	0.002	0.003				
E132	8963	1 27 29	−45 50.8	6.96	5.323	4.544	3.086	1.076	0.505	1.012	2	K4.5 III :	K4/5 III	0.04
				0.00	0.003	0.009	0.004	0.003	0.003	0.003				
E136	7570	1 15 11	−45 31.9	4.96	2.375	1.923	1.291	0.522	0.189	0.501	5	G0 V !	G0 V	0.00
				0.00	0.003	0.002	0.002	0.001	0.004	0.002				
E137	6767	1 07 48	−41 29.2	5.21	2.074	1.518	0.697	0.260	0.084	0.216	4	A4 V	A3 IV/V	0.02
				0.00	0.003	0.004	0.004	0.002	0.003	0.004				
E138	8651	1 24 40	−41 29.6	5.42	3.712	3.098	2.105	0.795	0.300	0.745	2	G8 II !	K0 III	0.07
				0.00	0.005	0.005	0.005	0.005	0.007	0.004				
E141	8681	1 24 42	−44 31.7	6.26	4.061	3.430	2.325	0.859	0.343	0.785	3	K0.5 II	K1 II	0.07
				0.00	0.033	0.028	0.005	0.003	0.006	0.003				
E142	10167	1 38 30	−42 55.7	6.66	2.101	1.574	0.914	0.383	0.132	0.359	5	F0 V	F0 V	0.03
				0.00	0.004	0.004	0.003	0.003	0.002	0.003				
E201	25714	4 02 48	−44 17.8	8.81	2.155	1.537	0.656	0.231	0.069	0.181	2	A4 V	A1 V (m)	0.00
				0.00	0.013	0.007	0.005	0.007	0.009	0.006				
E202	25843	4 03 44	−44 44.0	7.64	2.178	1.579	0.740	0.269	0.073	0.223	2	A5 V	A1m, A2–A7	0.01
				0.00	0.020	0.014	0.019	0.011	0.009	0.004				
E203	26273	4 07 24	−44 00.0	9.66	2.207	1.570	0.804	0.334	0.102	0.302	3	A2 V	A2/3 III	0.18
				0.00	0.017	0.014	0.010	0.004	0.003	0.006				
E204	25653	4 02 16	−44 39.8	8.19	2.195	1.513	0.645	0.239	0.057	0.195	2	A2 V	A3 IV/V	0.05
				0.00	0.007	0.008	0.005	0.009	0.017	0.009				

Table 1 (continued)

Star	HD	$\alpha(2000)$ h m s	$\delta(2000)$ ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
E205	26074	4 05 34	–45 40.0	7.56	2.305	1.614	0.789	0.312	0.088	0.289	2	A5 IV	A7 II/III	0.07
				0.00	0.013	0.008	0.010	0.003	0.006	0.007				
E214	24976	3 56 17	–43 37.1	8.13	2.263	1.787	1.181	0.488	0.150	0.475	3	F6 V	F5/6 V	0.02
				0.00	0.031	0.024	0.013	0.004	0.004	0.005				
E215	25503	4 01 08	–44 26.8	8.46	2.148	1.697	1.163	0.511	0.177	0.482	3	F6 IV :	F6 V	0.04
				0.00	0.006	0.006	0.008	0.005	0.006	0.009				
E216	25740	4 02 58	–44 23.4	8.12	2.492	2.023	1.391	0.565	0.190	0.555	3	G1 V	G3 V	0.03
				0.00	0.006	0.005	0.006	0.004	0.006	0.005				
E217	26244	4 07 06	–44 56.7	8.34	2.316	1.877	1.280	0.526	0.184	0.507	3	F9.5 V	F8 IV	0.00
				0.00	0.011	0.007	0.005	0.004	0.006	0.006				
E218	25842	4 03 45	–44 28.8	8.48	2.658	2.235	1.545	0.602	0.233	0.605	2	G6 V	G5 V	0.03
				0.00	0.006	0.005	0.005	0.007	0.009	0.006				
E220		4 03 44	–44 27.5	9.50	2.419	1.941	1.313	0.526	0.169	0.519	2	G0 IV		0.00
				0.00	0.014	0.010	0.009	0.007	0.010	0.004				
E223	25138	3 57 42	–44 44.3	8.69	2.989	2.492	1.722	0.680	0.245	0.668	2	G5.5 III–IV	G8 IV	0.05
				0.00	0.006	0.009	0.008	0.004	0.004	0.004				
E227	25301	3 59 20	–43 55.0	6.83	3.905	3.284	2.221	0.823	0.312	0.773	3	G9 II	K1 III	0.06
				0.00	0.006	0.007	0.006	0.004	0.009	0.006				
E233	25795	4 03 29	–44 08.3	8.03	4.852	4.142	2.848	1.013	0.449	0.939	2	K3.2 III	K3 III	0.09
				0.00	0.016	0.007	0.009	0.005	0.007	0.011				
E234	25762	4 03 04	–44 35.3	8.75	3.681	3.086	2.075	0.769	0.316	0.746	2	K0 III !	K1/2 III	0.01
				0.00	0.039	0.011	0.024	0.046	0.050	0.049				

Table 1 (continued)

Star	HD	α(2000) h m s	δ(2000) ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
E235		3 58 52	−44 29.9	9.39	3.695	3.066	2.086	0.801	0.329	0.760	2	G9 III	K0	0.07
				0.00	0.040	0.006	0.025	0.009	0.011	0.004				
E236	25966	4 04 47	−44 40.1	8.02	5.636	4.723	3.288	1.185	0.522	1.113	2	M2 III	M1 III	0.04
				0.00	0.048	0.005	0.016	0.012	0.006	0.004				
E237		4 03 05	−44 11.2	9.94	3.058	2.580	1.761	0.683	0.259	0.688	2	G6 III–IV	K2	0.04
				0.00	0.020	0.038	0.012	0.003	0.004	0.011				
E238		3 56 45	−44 36.9	9.66	5.107	4.393	2.943	1.025	0.485	0.964	2	K4 III :	M0	0.04
				0.00	0.041	0.024	0.023	0.004	0.005	0.004				
E241	24805	3 54 37	−46 25.0	6.90	2.103	1.542	0.709	0.253	0.081	0.211	2	A6 V	A3 V	0.00
				0.00	0.007	0.005	0.004	0.004	0.007	0.006				
E244	27019	4 14 08	−46 07.8	6.77	2.334	1.879	1.276	0.530	0.196	0.513	8	F9.5 V !	F8/G0 V	0.00
				0.00	0.003	0.002	0.002	0.003	0.007	0.002				
E245	27588	4 19 16	−44 16.1	5.33	3.852	3.242	2.196	0.814	0.324	0.772	4	K0.5 III !	K2 III	0.03
				0.00	0.004	0.003	0.003	0.002	0.004	0.003				
E255		3 58 10	−44 00.3	10.31	2.239	1.730	1.122	0.480	0.164	0.435	3	F4 V	F5	0.06
				0.00	0.030	0.009	0.025	0.009	0.015	0.005				
E256		3 56 47	−45 30.2	9.90	3.465	2.999	1.989	0.701	0.382	0.740	2	K2.7 V	K0	0.00
				0.00	0.005	0.005	0.005	0.006	0.005	0.006				
E264	26612	4 10 50	−41 59.6	4.93	2.279	1.657	0.927	0.386	0.127	0.370	2	F1 IV :	F2 IV/V	0.00
				0.00	0.003	0.004	0.004	0.003	0.004	0.003				
E256N		3 56 20:	−45 31.0:	10.04	2.289	1.813	1.224	0.518	0.177	0.525	2	F8 V		0.01
				0.00	0.025	0.026	0.025	0.023	0.013	0.023				

Table 1 (continued)

Star	HD	$\alpha(2000)$ h m s	$\delta(2000)$ ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
E304	47671	6 37 42	−44 29.7	7.68	1.929	1.371	0.529	0.209	0.081	0.112	1	A1 V	A0 V	0.03
				0.00	0.101	0.119	0.101	0.046	0.023	0.022				
E322	47720	6 37 58	−44 17.0	8.46	2.194	1.700	1.107	0.488	0.178	0.444	2	F4 IV	F5 V	0.07
				0.00	0.009	0.010	0.017	0.010	0.012	0.020				
E335	46415	6 31 04	−43 43.0	6.68	3.533	2.939	2.010	0.767	0.295	0.721	2	G8.5 III !	G8 III	0.05
				0.00	0.005	0.004	0.004	0.002	0.003	0.004				
E337	46652	6 32 19	−45 18.6	7.17	3.782	3.161	2.155	0.811	0.328	0.778	1	K0 III !	K0 III	0.06
				0.00	0.021	0.018	0.017	0.006	0.006	0.010				
E347	50223	6 49 54	−46 36.9	5.14	2.171	1.684	1.094	0.466	0.160	0.446	5	F5 V !	F5 V	0.00
				0.00	0.005	0.002	0.002	0.002	0.004	0.002				
E350	48402	6 40 47	−47 37.3	6.65	0.966	0.714	0.270	0.119	0.043	0.076	2	B5 V	B3/5 V	0.02
				0.00	0.003	0.003	0.003	0.002	0.002	0.003				
E352	52362	6 58 41	−45 46.0	6.21	1.764	1.251	0.465	0.168	0.062	0.109	3	A0.5 V	A0 V	0.01
				0.00	0.004	0.003	0.003	0.003	0.002	0.004				
E429	80777	9 20 15	−45 10.4	6.70	4.467	3.770	2.536	0.908	0.412	0.849	2	K2.5 III	K2 III	0.04
				0.00	0.005	0.005	0.008	0.003	0.003	0.004				
E445	82224	9 29 22	−43 11.4	6.60	2.345	1.780	1.142	0.489	0.176	0.456	4	F3 V	F5 IV	0.10
				0.00	0.004	0.004	0.004	0.003	0.003	0.003				
E478	79694	9 14 08	−44 08.8	5.84	1.043	0.750	0.281	0.132	0.045	0.088	3	B5 IV	B5 V	0.03
				0.00	0.004	0.004	0.004	0.003	0.003	0.005				
E496	80205	9 16 58	−45 00.7	6.74	1.877	1.273	0.454	0.181	0.057	0.116	2	A0 V	A0 V	0.01
				0.00	0.004	0.004	0.004	0.002	0.002	0.004				

Table 1 (continued)

Star	HD	α(2000)	δ(2000)	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
		h m s	° ′											
E497	81347	9 23 25	-48 17.2	6.27	0.897	0.637	0.255	0.134	0.041	0.098	2	B4 V !	B3 IV	0.05
				0.00	0.005	0.005	0.005	0.002	0.002	0.005				
E803	189226	20 00 53	-45 41.9	8.74	1.885	1.332	0.505	0.187	0.059	0.122	2	A1.5 V	A0 V	0.00
				0.00	0.007	0.011	0.012	0.013	0.007	0.006				
E810	192758	20 18 15	-42 51.5	7.01	2.106	1.591	0.902	0.359	0.113	0.356	2	F0 V	F0 V	0.01
				0.00	0.005	0.005	0.004	0.004	0.003	0.003				
E816	190709	20 08 01	-44 11.5	8.47	2.193	1.715	1.120	0.464	0.157	0.451	2	F6 V	F5 V	0.00
				0.00	0.010	0.007	0.007	0.002	0.004	0.004				
E826	191349	20 11 12	-43 39.7	6.54	3.231	2.662	1.820	0.703	0.254	0.669	6	G2.5 II	G5/6 III	0.07
				0.00	0.008	0.011	0.013	0.005	0.004	0.004				
E828	189563	20 02 36	-45 11.8	6.56	4.315	3.648	2.484	0.902	0.374	0.843	3	K1.7 III !	K1 III	0.06
				0.00	0.007	0.004	0.006	0.004	0.004	0.004				
E829	191117	20 10 05	-43 53.6	6.92	3.639	3.051	2.080	0.775	0.299	0.737	1	G9.5 III	K0 III	0.02
				0.00	0.007	0.007	0.008	0.006	0.006	0.006				
E844	192886	20 19 17	-47 34.8	6.12	2.185	1.725	1.130	0.465	0.163	0.446	5	F6 V	F5 V	0.00
				0.00	0.004	0.004	0.003	0.002	0.002	0.003				
E845	193571	20 22 27	-42 03.0	5.57	1.825	1.297	0.472	0.168	0.049	0.103	3	A0 V :	A0 V	0.01
				0.00	0.005	0.004	0.004	0.004	0.003	0.003				
E874	191116	20 09 59	-41 50.8	7.99	5.665	4.721	3.249	1.184	0.536	1.142	1	M2 III	M2 III	0.02
				0.00	0.049	0.034	0.021	0.005	0.007	0.007				
E876	189292	20 01 04	-44 23.1	8.88	5.297	4.623	3.154	1.084	0.545	1.034	1	K5.5 III	K3/4 III	0.03
				0.00	0.037	0.025	0.023	0.011	0.009	0.010				

Table 1 (continued)

Star	HD	α(2000) h m s	δ(2000) ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
E942	214094	22 36 41	−43 28.2	6.75	2.267	1.793	1.199	0.508	0.180	0.495	1	F6 V	F8 V	0.05
				0.00	0.008	0.009	0.009	0.007	0.006	0.007				
E974	213009	22 29 16	−43 29.7	3.96	3.671	3.067	2.117	0.799	0.285	0.732	4	G5.5 II !	G6/8 III	0.09
				0.00	0.010	0.012	0.010	0.003	0.009	0.011				
E975	213080	22 29 45	−43 45.0	4.13	5.591	4.513	3.161	1.294	0.471	1.196	2	M3 II :	M3 III	0.00
				0.00	0.005	0.010	0.004	0.005	0.005	0.006				
F101	21024	3 15 57	−77 23.3	5.51	2.185	1.698	1.084	0.447	0.155	0.425	15	F5 V	F5 V	0.00
				0.00	0.006	0.003	0.003	0.003	0.003	0.002				
F106		3 30 07	−74 35.7	7.52	2.151	1.541	0.687	0.248	0.085	0.208	3	A4 V	A3/4 IV/V	0.01
				0.00	0.004	0.004	0.003	0.003	0.003	0.005				
F118		4 14 30	−75 48.5	7.23	5.759	4.869	3.368	1.215	0.573	1.151	6	M1 III	M1 III	0.10
				0.00	0.012	0.008	.004	0.006	0.005	0.003				
F120		4 34 15	−73 12.6	6.80	3.421	2.827	1.944	0.763	0.284	0.707	5	G7 III !	G8 III	0.06
				0.00	0.004	0.003	0.003	0.003	0.004	0.002				
F121		4 34 34	−72 44.0	6.99	2.262	1.603	0.757	0.293	0.104	0.262	5	A4 V !	A6 IV/V	0.06
				0.00	0.005	0.004	0.003	0.002	0.003	0.003				
F122		4 38 21	−77 39.3	6.05	3.882	3.254	2.229	0.835	0.319	0.778	5	G9 II	K2 III	0.07
				0.00	0.004	0.003	0.003	0.003	0.003	0.003				
NGC2298-A		6 48 19	−35 59.0	11.22	2.332	1.733	0.913	0.376	0.133	0.346	1	A6 V		0.16
				0.01	0.034	0.042	0.005	0.007	0.006	0.006				
47 Tuc-A		0 20 28	−71 58.0	8.36	4.095	3.458	2.331	0.855	0.361	0.808	2	K1 III !		0.06
				0.01	0.005	0.004	0.007	0.007	0.007	0.007				
47 Tuc-B		0 27 29	−71 52.5	8.54	2.238	1.777	1.180	0.494	0.184	0.464	2	F8 V		0.00
				0.01	0.014	0.005	0.005	0.004	0.004	0.006				

Table 1 (continued)

Star	HD	α(2000) h m s	δ(2000) ° ′	V	$U-V$	$P-V$	$X-V$	$Y-V$	$Z-V$	$V-S$	n	Sp(phot)	Sp(MK)	E_{B-V}
47 Tuc-C		0 27 43	-72 07.3	9.62	3.975	3.361	2.271	0.839	0.342	0.773	4	K0.7 III !		0.05
				0.04	0.013	0.024	0.009	0.005	0.003	0.011				
47 Tuc-D		0 19 53	-72 07.1	10.64	2.122	1.655	1.104	0.477	0.146	0.480	4	F6 V		0.00
				0.05	0.017	0.006	0.036	0.010	0.025	0.011				
47 Tuc-E		0 22 07	-72 21.5	11.69	2.130	1.648	1.064	0.464	0.159	0.422	5	F5 V		0.00
				0.06	0.021	0.014	0.010	0.007	0.013	0.016				
	2796	0 31 17	-16 47.7	8.50	2.765	2.044	1.479	0.701	0.234	0.682	1		MDGE-G5	
				0.01	0.019	0.019	0.017	0.011	0.007	0.009				
CD	-38°245	0 46 36	-37 39.6	11.95	2.772	2.078	1.501	0.742	0.258	0.699	3		MDGE	
				0.01	0.029	0.019	0.023	0.012	0.008	0.012				
	29907	4 38 22	-65 24.9	9.81	2.199	1.795	1.324	0.586	0.236	0.595	1		sdG4	
				0.02	0.020	0.018	0.029	0.022	0.015	0.024				
	30229	4 41 14	-65 18.8	9.39	2.430	1.833	1.350	0.655	0.227	0.615	1		G2wp	
				0.01	0.020	0.021	0.024	0.014	0.017	0.023				
	47147	6 34 55	-45 18.5	9.22	2.278	1.584	0.986	0.493	0.159	0.483	2		RHB - F3	
				0.01	0.013	0.011	0.008	0.005	0.006	0.005				
	55195A	7 09 18	-49 58.7	8.76	2.078	1.502	0.895	0.425	0.120	0.417	3		A2 III+Fpec	
				0.01	0.007	0.006	0.005	0.005	0.013	0.004				
	55195B	7 09 18	-49 58.7	10.37	4.154	3.545	2.371	0.873	0.367	0.840	2	K1.2 III ?		
				0.01	0.022	0.055	0.016	0.011	0.010	0.010				
	84903	9 47 19	-41 27.1	7.98	3.815	2.846	2.101	0.983	0.345	0.911	1		MDGE-K0	
				0.02	0.029	0.018	0.017	0.009	0.010	0.014				
	211998	22 24 37	-72 15.3	5.28	2.347	1.867	1.371	0.608	0.206	0.594	2		A3 V+F9 V	
				0.03	0.006	0.009	0.009	0.004	0.003	0.003				