STANDARD STARS FOR THE COMPARISON OF METHODS OF DIAMETER DETERMINATION

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Fracassini, et al. (1983) suggested a preliminary list of stars suitable for use as standards for methods of determination of stellar apparent diameters and absolute radii. According to their criteria, only stars with at least three methods of determination were considered; moreover, only if the percentage error of the data was $<10\%$ were they considered as "standards". This simple statement is not completely satisfactory, because of some ambiguous cases. For instance, the interferometric method (code 1), Wesselink's method (6H) and Barnes and Evans' (6G) method are not independent.

In order to supply a useful set of stars for the comparison of methods of diameter determination, more restrictive criteria are proposed: we designate as 'primary standards' those stars whose diameter or radius is determined by at least a) three independent methods and has a percentage error ε less than 10% (the most common error in the stellar dimension determinations), or b) two direct methods (generally considered more reliable than the indirect ones) with $\varepsilon < 5\%$. Table I gives the only nine stars we found in CADARS (Fracassini, et al. 1981) which satisfy the criteria. The columns give, respectively: the identification, the spectral type (Hoffleit, et al. 1982), the averaged values of d" (uniform disk) or $R/R_{\odot}$ with their standard deviations, the number of values available and a code designating the method (Fracassini, et al. 1981). The small number of primary standards emphasizes the need for many other determinations to cover all spectral types and luminosity classes in the HR diagram.

At present, to extend this set of stars, we designate as 'secondary standards' those stars whose dimensions are determined by at least two independent methods, of which one is a direct method; moreover, the percentage error has to be less than 5%. Table IIa gives 17 secondary standards for measurements of stellar apparent diameters; most of them are giants of late spectral type. Other stars belonging to CADARS and satisfying the above-mentioned criteria were disregarded owing to their peculiarity with respect to the different methods (Pastori et al. 1985).

D. S. Hayes et al. (eds.), Calibration of Fundamental Stellar Quantities, 455–457.

https://doi.org/10.1017/S0074180900079201 Published online by Cambridge University Press

TABLE I. Primary standards

HD	Name	Sp.Type	d"(arcsec) or $R/R_\odot$	n	Code
14386	o Cet	M7IIIe	0.0571 ± 0.0010	4	1,3B,6G
29139	α Tau	K5III	0.0200 ± 0.0010	5	1,2,6G
48915	α CMa	A1Vm	0.0060 ± 0.0004	6	1,6F,6G,6I
124897	α Boo	K1IIIb	0.0201 ± 0.0010	5	1,3B,6G
148478	α Sco	M1Iab-Ib	0.0409 ± 0.0020	5	2,3B,6G
172167	α Lyr	A0Va	0.0032 ± 0.0002	3	1,6G,6F
48915	α CMa	A1Vm	1.83 ± 0.13	5	4,6F,6H,6I
61421	α CMi	F5IV-V	2.207 ± 0.029	3	4, 6G,6I
213306	δ Cep	F5Ib-G2Ib	41.4 ± 1.58	15	5,6G,6I

TABLE IIa. Secondary standards: apparent diameters

HD	Name	Sp.Type	d"(arcsec)	n	Code
18191	45 Ari	M6III	0.01009 ± 0.00039	4	2,6I
38307	γ Tau	C5II	0.00838 ± 0.00028	3	2,6I
47105	γ Gem	A0IV	0.00130 ± 0.00003	2	1,6F
86663	π Leo	M2IIIab	0.00504 ± 0.00022	3	2,6H
87837	31 Leo	K3.5IIIb	0.00340 ± 0.00014	3	2,6I
102212	ν Vir	M1IIIab	0.00640 ± 0.00022	4	2,6I
102647	β Leo	A3V	0.00129 ± 0.00005	2	1,6F
112142	ψ Vir	M3III	0.00568 ± 0.00023	3	2,6I
123934		M2III	0.00426 ± 0.00019	3	2,6I
169916	λ Sgr	K1IIIb	0.00430 ± 0.00014	2	2,6I
172816		M4III	0.00845 ± 0.00035	2	2,6I
187642	α Aql	A7V	0.00270 ± 0.00012	4	1,6F
193495	β Cap	F8V+A0	0.00313 ± 0.00007	3	2,6I
196777	Ups Cap	M2III	0.00453 ± 0.00015	4	2,6H,6I
216386	λ Aqr	M2.5IIIa	0.00793 ± 0.00038	4	2,6I
223075	TX Psc	C5II	0.00942 ± 0.00011	10	2,6I
	V774 Sgr		0.00568 ± 0.00004	2	2,6I

Table IIb gives a preliminary list of secondary standards for absolute radius determinations. However, these stars should be used with particular caution as, so far, comparisons of various methods of radius determination have not been carried through.

TABLE IIb. Secondary standards: absolute radii

HD	Name	$R/R_\odot$	n	Code
33088	TT Aur S	3.493 ± 0.011	7	4,6H
34364	AR Aur G	1.838 ± 0.003	10	4,6H
34364	AR Aur S	1.802 ± 0.039	10	4,6H
40183	β Aur G	2.55 ± 0.11	8	4,6H
44701	IM Mon G	3.86 ± 0.028	2	4,6H
44701	IM Mon S	2.71 ± 0.014	2	4,6H
45412	RT Aur	23.9 ± 0.85	6	5,6I
46052	WW Aur G	1.98 ± 0.071	10	4,6H
46052	WW Aur S	1.938 ± 0.026	10	4,6H
72257	VZ Hya G	1.256 ± 0.009	5	4,6H
72257	VZ Hya S	1.055 ± 0.007	5	4,6H
121909	BH Vir G	1.12 ± 0.014	3	4,6H
121909	BH Vir S	1.06 ± 0.028	3	4,6H
139006	α CrB	2.695 ± 0.007	3	4,6H
156247	U Oph G	3.31 ± 0.042	10	4,6H
156247	U Oph S	3.11 ± 0.025	10	4,6H
156965	TX Her G	1.79 ± 0.072	9	4,6H
170470	V451 Oph G	2.52 ± 0.085	5	4,6H
170470	V451 Oph S	2.019 ± 0.083	5	4,6H
170757	RX Her G	2.348 ± 0.117	11	4,6H
170757	RX Her S	1.925 ± 0.078	10	4,6H
185507	σ Aql S	3.502 ± 0.068	8	4,6H
185912	V1143 Cyg G	1.4 ± 0.057	3	4,6H
185912	V1143 Cyg S	1.265 ± 0.007	3	4,6H
188727	S Sge	56.37 ± 0.52	7	5,6H
205234	EI Cep S	2.39 ± 0.106	3	4,6H
209147	CM Lac G	1.506 ± 0.033	8	4,6H
209147	CM Lac S	1.319 ± 0.058	8	4,6H
216014	AH Cep G	6.262 ± 0.002	7	4,6H
218066	CW Cep S	4.365 ± 0.078	4	4,6H
52.03383	RT And G	1.438 ± 0.045	4	4,6H

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