Rev. Mexicana Astron. Astrof., 9, 9-12 (1984)

A NOTE ABOUT THE COMPARISON BETWEEN THE 'OLD' AND 'NEW' SLETTEBAK SYSTEMS OF AXIAL ROTATIONAL VELOCITIES

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Received 1983 July 27

RESUMEN

Hemos redeterminado, en el nuevo sistema definido por Slettebak en 1975, las velocidades de rotación axial proyectada de 207 estrellas de tipo B, A y F tempranas. Se obtuvieron rectas de regresión que permiten relacionar en forma estadística el viejo sistema de Slettebak, definido a fines de la década del 40 y principios de la del 50, con el nuevo sistema. Las velocidades que se obtienen en este último, son menores que en el sistema viejo tal lo predicho por Slettebak en 1975.

ABSTRACT

We redetermined projected-axial-rotational velocities for 207 stars in the 'new' Slettebak system. We discussed the relation between the 'old' and the 'new' systems obtaining regression lines to convert values from one system to the other.

Key words: **ROTATIONAL VELOCITIES – B STARS – A STARS**

I. INTRODUCTION

Recently Uesugi and Fukuda (1982) published the Revised Catalogue of Stellar Rotational Velocities. The Catalogue contains V sin i values for 6472 stars measured in the 'old' Slettebak system defined by this author between 1949 and 1956 (see Slettebak 1949, 1954, 1955, 1956; Slettebak and Howard 1955). In 1975 Slettebak *et al.* (1975) established a 'new', more refined, system of standard stars. The latter authors estimated that the 'new' system would produce V sin i values 15% lower than the 'old' system for B type stars and 5% lower for A-F stars.

In this paper we redetermined the projected rotational velocities of 207 stars whose V sin i values in the 'old' system were determined by Levato and Malaroda (1970), Levato (1972) and Levato (1975). The purpose is to provide an empirical comparison between both systems and to determine regression lines to convert, statistically, measures from one system to the other.

II. OBSERVATIONAL MATERIAL AND RESULTS

The spectra were taken with the Cassegrain spectrographs of the 0.9-m and 1.5-m telescopes at Cerro Tololo Inter-American Observatory and with the spectrograph of the 1.52-m telescope at the Bosque Alegre station in Cordoba, Argentina. Standard stars were taken with the same instruments and were used to compare visually with the program stars. For this purpose we used a *spectra* comparator made at Marseille for La Plata Observatory.

Table 1 presents the V sin i values in the 'new' Slettebak system. The spectral types were taken from the previous papers by Levato (1972, 1975) and Levato and Malaroda (1970). Figure 1 shows the relation between the V sin i values in both systems for the B-type stars, while Figure 2 shows the same for the A-F stars. The regression lines computed using Table 1 and the old values published in Slettebak's papers are:

$$V \sin i\,(\text{new}) = 0.93\ V \sin i\,(\text{old}) - 6 \quad ,$$

for B-type stars.

and

$$V \sin i\,(\text{new}) = 0.92\ V \sin i\,(\text{old}) - 2 \quad ,$$

for the A-F stars, in units of km s^{-1}.

These relations should not be regarded as the definitive transformation between both systems; they are simply the relations that we have found for our measurements. We need these relations to use them in forthcoming papers on the rotation in open clusters where we will compare the average rotation of cluster members (determined with measurements in the new system) with the

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TABLE 1

ROTATION VELOCITIES IN THE NEW SLETTEBAK SYSTEM

HD, CPD ADS	MK	V sin i (N)	HD, CPD ADS	MK	V sin i (N)
1061	F0V	85	66546	B4V	115
2885	A2V	≤ 40	68761	B2IVe	300
9556 A	A3V	200	73882	O9V	170
9656 B	F5:V	55	74956	A1V	100
15695	A7V	80	75378	B2III	70
16046 A	B9.5V	90	75759	O9IV	50
16046 B	A3V	200	75821	B0III	≤ 40
16555	A8 III	200	76805	B4V	60
17543	B6IV	60	80781	B7IV	90
18978	A7IV	130	81188	B2IV	40
20320	Am	80	86659	B3V	145
23466	B3V	95	88955	A2V	95
23754	F3V	≤ 40	89890	B3IV	≤ 40
25204	B3V+A	80	91375	A1V	≤ 40
25267	Ap	≤ 40	91636	A1V	≤ 40
27376	B8.5Vp	≤ 40	99211	A7III	120
27411	Am	≤ 40	102660	Am	≤ 40
27628	Am	40	103192	B9IV	50
27749	Am	≤ 40	104337	B1.5V	70
29140	Am	≤ 45	104671	Am	50
29376	B3V	240	104841	B2IV	40
30211	B5IV	80	109026	B5V	125
30422	A3IV	130	109536	A7III	80
31237	B2III	60	110335	B7IV	205
32040 A	B8V	350	110379	F0V	≤ 40
32040 B	B9V	300	110951	Am	70
34527 A	B9V	300	111775	A0IV	≤ 40
34527 B	A1V	≤ 40	112092 B	B4V	240
34816	B0.5IV	≤ 40	114911	B8V	270
34868	A0IV	50	116458	Ap	≤ 40
35149 A	B1V	280	120640	B4III	50
35149 B	B3V	300	120955	B5IV-V	≤ 40
35281 A	B8V	140	121263	B2V	175
35281 B	A5IV	90	123515	B9IV	≤ 40
35588	B2V	120	124471	B1III	≤ 40
36486	B2.5V	110	125158	Am	60
36695	B1V	170	125288	B8III	55
37017	B2V	≤ 45	125337	Am	< 40
40494	B3IV	60	126129 A	A0V	125
41841	Am	≤ 40	126341	B2IV	≤ 40
43107	B8V	85	129175 B	A7V	185
46328	B0III	≤ 40	129422	A9V	250
48434	B0III	65	129723	Am	75
49591	B8Ve	215	130819	F3V	45
50223	F6:5:IV-V	50	130841	A6III	100
50506	A5III	140	133652	Ap	70
51557	B8V	100	134482	A3IV	175
53704	Am	≤ 45	134687	B3IV	< 40
56022	Ap	≤ 40	135379	A3IV	85
57061	O9.5III	90	135876	B0V	110
60532	F7IV	≤ 40	139664	F5IV	80
60753	B6IV	120	140008	B5IV	90

TABLE 1 (CONTINUED)

HD, CPD ADS	MK	V sin i (N)	HD, CPD ADS	MK	V sin i (N)
140873	B8IV	100	193281 A	A2III	100
141556	B9IV	≤ 40	193281 B	A2IV	85
142049	Am	70	195093	A8V	110
142114	B2.5V	290	195094	A2V	230
142217 A	B1V	90	195627	A9III	150
142217 B	B2V	50	195961	δ Scu	≤ 40
142629	A3V	80	196544	A2V	60
142630	B9V	200	197157	A7IV	115
143018	B1V	95	198391	A1V	≤ 40
143474	A7V	125	198743	Am	70
144217	B0.5IV	100	199443	A7IV	70
144426	Am	60	202730	A5V	185
145502 A	B2V	150	204188	Am	60
145502 B	B9Vp	75	205767	A7V	135
149430	B0III	≤ 40	206742	A0V	< 45
156928	A1V	105	207098	Am	80
157243	B6V	120	207155	A2V	165
157919	δ Scu	80	208718 A	F2V	100
158926	B2IV	135	209859	A7V	90
159082	B9.5IV	60	210049	A2Ve	280
161270	A0V	85	213398	A0V	< 40
161289	A0V	150	216336	A0V	50
164353 B	B1V	150	220391	A3III	120
164492 A	O7V	≤ 40	220932	A4III	150
164492 B	B1V	150	223024 A	F0IV	70
165040	A3V	≤ 40	223024 B	F2III	100
165475 A	A3IV	200	223991 A	A2V	≤ 45
169022	B9IV	150	223991 B	F2V	50
170465	B6IV	50	224113	B6V	280
170523	B3III	70	-40°1027 A	A3V	250
171034	B2V	120	-40°1027 B	A0:IV:	160
171978	A2V	80	-32°1479 A	A5IV	170
173300	B8III	75	-34°1626 A	A3V	160
176270 A	B8V-IV	≤ 45	-34°1626 B	F7V	90
176270 B	B9V	180	ADS 3355 A	A0V	≤ 45
178125	B8III	50	ADS 3355 B	A1IV	≤ 45
181182	B8III	90	ADS 3910 A	B2IV-V	≤ 40
181454 B	A5V	140	ADS 4134 B	B2.5V	110
184035	A5IV-V	60	-42°1975 A	A8III	120
184552	Am	≤ 45	-42°1975 B	F5V	80
184915	B0.5III	200	-75°1409 A	A0V	85
185344 A	F1IV	60	-75°1409 B	A0V	100
185344 B	F2III	90	-52°11213 A	A2V	85
185936	B5V	100	-52°11213 B	A0V	≤ 40
188293 A	B6V	300	-63°4566 A	A0IV	105
188097	Am	70	-63°4566 B	A1III	200
188728	A1IV	≤ 45	ADS 13946 A	B7V	90
189103	B3IVp	50	ADS 15147 A	A1V	85
189198	A7III	130	ADS 15147 B	F2V	≤ 40
190850 A	A1IV-V	160	-73°2253 A	A1V	≤ 45
190850 B	A2V	140	-73°2252 B	A1V	90
191692	B9III	65			

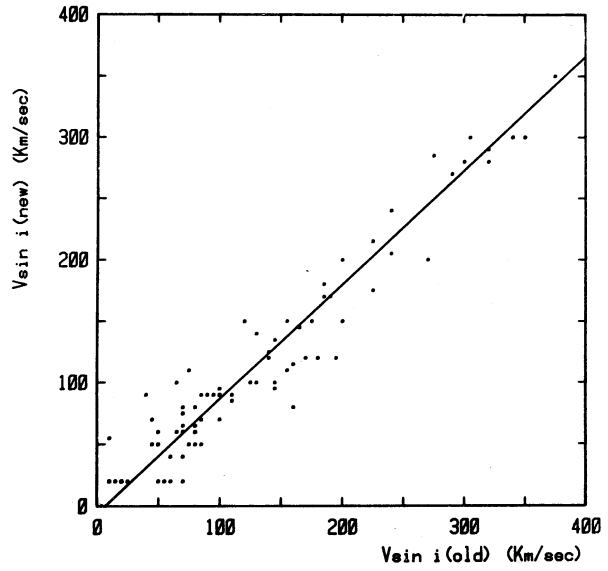

Fig. 1. Relation between the V sin i values in the 'new' and 'old' Slettebak systems for B-type stars. The regression line is also shown.

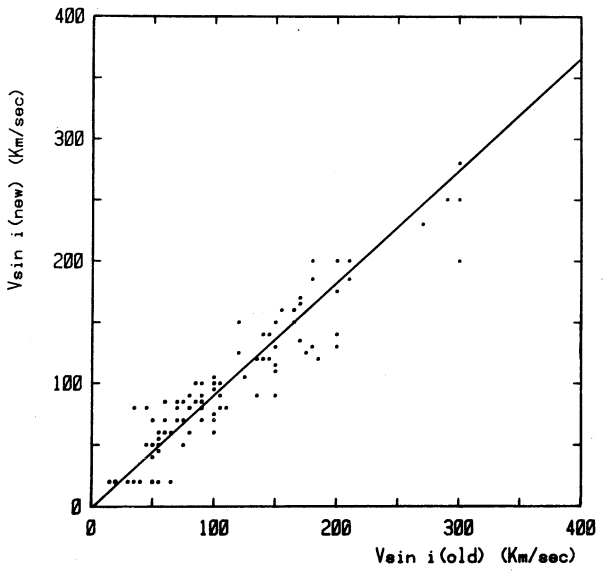

Fig. 2. Relation between the V sin i values in the 'new' and 'old' Slettebak systems for A-F type stars. The regression line is also shown.

average for field stars (using measurements taken from the Uesugi and Fukuda Catalogue in the old system).

The support of the Comisión de Investigaciones Científicas de la Provincia de Buenos Aires and of the Subsecretaría de Ciencia y Tecnología is deeply appreciated.

REFERENCES

Levato, H. 1972, *Pub. A.S.P.*, **84**, 584.
Levato, H. 1975, *Astr. and Ap. Suppl.*, **19**, 91.
Levato, H. and Malaroda, S. 1970, *Pub. A.S.P.*, **82**, 741.
Slettebak, A. 1949, *Ap. J.*, **110**, 498.
Slettebak, A. 1954, *Ap. J.*, **119**, 116.
Slettebak A. 1955, *Ap. J.*, **121**, 653.
Slettebak, A. 1956, *Ap. J.*, **124**, 173.
Slettebak, A. and Howard, R.F. 1955, *Ap. J.*, **121**, 102.
Slettebak, A., Collins, G.W., II., Boyce, P.B., White, N.M., and Perkinson, T.D. 1975, *Ap. J. Suppl.*, **29**, 137.
Uesugi, A. and Fukuda, I. 1982, *Revised Catalogue of Stellar Rotational Velocities* (Japan: University of Kyoto).

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