

Rotational Velocities of B, A, and Early-F Stars

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Abstract. Projected rotational velocities for 67 B, A, and early-F stars have been determined. Some of these stars are early-type, radial-velocity standard candidates. The spectra of seven stars show metallic lines with composite profiles that consist of a narrow component near the center of a broad component, suggesting that they may be shell stars or binaries.

1. Observations and $v \sin i$ Measurements

We have obtained spectroscopic observations of 67 B, A, and F stars with the Kitt Peak National Observatory coude feed telescope, coude spectrograph, and a TI CCD detector. Spectrograms are centered in the red at 6430 Å or in the blue at 4500 Å, cover a wavelength range of ~ 80 Å, and have a resolution of ~ 0.21 Å.

For stars with $v \sin i < 60$ km s⁻¹, we used the procedure of Fekel (1997). We assumed no macroturbulent velocity for stars of B and A spectral class, while for early-F stars we adopted and removed a macroturbulence of 5 km s⁻¹. We estimate uncertainties of 1 and 3 km s⁻¹ for $v \sin i$ values near 20 and 50 km s⁻¹, respectively. For stars with $v \sin i \geq 60$ km s⁻¹ and those with composite spectra, a reference star of similar spectral class was rotationally broadened. We estimate uncertainties of 5 and 10 km s⁻¹ for $v \sin i$ values near 75 and 125 km s⁻¹, respectively. For stars with projected rotational velocities in the range 40 – 60 km s⁻¹, the two methods produced essentially identical results. Our projected rotational velocities are listed in Table 1.

Acknowledgments. This research has been supported in part by NASA grant NCC5-511 and NSF grant HRD-9706268 to Tennessee State University.

References

Fekel, F. C. 1997, PASP 109, 514

Table 1. Projected rotational velocities of B, A, and Early-F stars

HD	Spectral Type	$v \sin i$ (km s ⁻¹)	HD	Spectral Type	$v \sin i$ (km s ⁻¹)
3360 ^a	B2 IV	20.3	105085 ^b	F1 dwarf	60.0
7169 ^b	F2 dwarf	90.0	107259Aa ^c	A2 IV	5.8
14252 ^a	A2 IVs	24.6	107966	A3 V	55.2
14622	F0 III-IV	48.6	108642A ^c	A2/A7/A7	6.9
17081	B7 V	20.9	109367	A5/A7/A7	15.6
18557	A2/A6:/F0	18.7	112412	A9/F4/F3	17.4
23793	B3 V	48.2	113867 ^b	A9 dwarf	120.0
23874 ^b	F2 dwarf	95.0	115604	F3 IV	4.1
26553	A3/A7/A5	6.1	117201	F2 V	10.1
27962 ^a	A2 IV-Vs	10.5	128093	F5 V	8.0
28114	B6 IV	20.1	128167 ^a	F2 V	7.7
29140Aa ^c	A4/A6/A7	40.1	145647	A1 III	49.0
32115	A9 V	11.8	145788	A1 IIIs	8.1
32537	F1 Vp	17.0	156897	F1 IV	19.9
33054	A2/F2/F3	40.8	157087	A3 IVs	11.3
35708 ^a	B2.5 IV	29.3	160295 ^b	F2 subgiant	70.0
38899 ^a	B9 IV	29.8	166182	B2 IV	44.6
40136	F2 IV	16.6	167858	F1 V	7.9
41692 ^a	B5 IV	36.0	179761	B8 II-III	16.3
43378	A1 Va	49.0	184552	A2/A7V/F0	11.0
47105	A2 IV	10.9	186377	A6 III	11.6
48843 ^a	A8 II	11.2	186568 ^a	B8 III	17.9
58142 ^a	A0mA1 IV	18.2	193432 ^a	B9.5 Va	23.9
65900 ^a	A1 IV	37.2	196426	B8 IIIp	3.7
72037	A3/A5/A7	12.2	196724	A0 IV	56.5
72660 ^a	A1 II	4.8	196821	A0 IIIps	22.6
75811	A4/A6/A7	11.1	202444 ^b	F2 subgiant	95.0
89021	A1 IV	55.7	207651 ^b	A8 giant	95.0
92728	A0 Vs	21.2	209459 ^a	B9.5 V	4.0
93903A ^c	A3/A7V/A9	20.6	214994	A1 IV	5.0
95418 ^a	A1 IV	48.5	216494A ^c	B9 III	1.6
97633 ^a	A2 IV	24.1	217811	B2 V	11.9
98280	A2 Vs	10.5	218753	A5/A7/F0	4.7
100518	A2/A5III/A6	6.6			

^a Early-type radial velocity standard candidate

^b Composite spectrum, $v \sin i$ is for broad-lined component

^c Primary of a double-lined spectroscopic binary