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 coudé feed telescope, coudé spectrograph, and a TI CCD detector. Spectrograms are centered in the red at 6430Å or in the blue at 4500Å, cover a wavelength range of ~80Å, and have a resolution of ~0.21Å.

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.

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References

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

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<th>Spectral Type</th>
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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