OPTICAL CONTINUUM FORMATION IN ROTATING-WIND MODELS OF WR STARS

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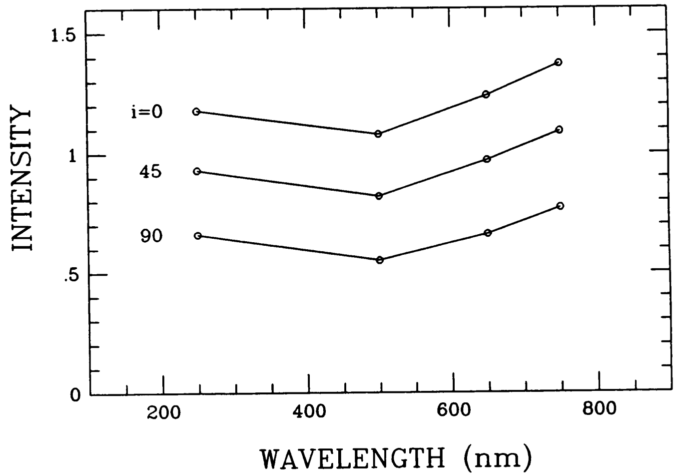
Wolf-Rayet stars could be rapid rotators. We must ask if a rotationally flattened wind can lead to an observed continuous spectrum that depends on the angle of inclination. Schmid-Burgk (1982) showed that in the radio region the spectral shape is not changed. Here we consider the optical region, where both thermal emission and electron scattering are important. This study uses a simple, idealized model of a rotating wind in which v(r) is from Friend and Abbott (1986), but depends on polar angle in the manner of Poe et al. (1989). Equatorial densities are five times polar values at the same radial distance. The wind consists only of fully ionized He surrounding a spherical core and has a radial optical depth of 2.0 in the equator in the limit of pure electron opacity, essentially at wavelengths less than 2000A. Radiative transfer in the wind is fully treated by a second-order moment method based on the equation of transfer in general spherical coordinates (Doherty 1989). A constant flux at the core boundary is assumed. This flux corresponds to a $T = 4x10^4K$ blackbody and the wind temperature is $2x10^4$. The shape of the emergent spectrum in the region computed (2500-7500A) changes little with inclination and resembles the spectrum of a spherical wind with intermediate density. Thus a rotating wind may masquerade as spherical but, in the present model at least, vary in flux by nearly a factor of two from pole to equator. This can affect the apparent magnitude, wind polarization, and possibly the line spectrum and wind acceleration.



Spectrum of rotating wind model for 3 inclinations of the polar axis to the line of sight. Units of intensity are $\pi R^2 F_c$, the intensity which would be observed for a spherical, pure-scattering wind.

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