On the importance of the wind emission to the optical continuum of OB supergiants

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Context: Thermal wind emission in the form of free-free and free-bound emission is known to show up in the infrared and radio continuum of hot and massive stars. For OB supergiants with moderate mass loss rates and a wind velocity distribution with $betasimeq 0.8ldots 1.0$, no influence of the wind to the optical continuum, i.e. for $lambda la 1.0,mu$m, is expected. Investigations of stellar and wind parameters of OB supergiants over the last few years suggest, however, that for many objects $beta$ is much higher than 1.0, reaching values up to 3.5.
Aims: We investigate the influence of the free-free and free-bound emission on the emerging radiation, especially at optical wavelengths, from OB supergiants having wind velocity distributions with $beta ge 1.0$.
Methods: For the case of a spherically symmetric, isothermal wind in local thermodynamical equilibrium (LTE) we calculate the free-free and free-bound processes and the emerging wind and total continuum spectra. We localize the generation region of the optical wind continuum and especially focus on the influence of a $beta$-type wind velocity distribution with $beta > 1$ on the formation of the wind continuum at optical wavelengths.
Results: The optical wind continuum is found to be generated within about $2,R_{*}$ which is exactly the wind region where $beta$ strongly influences the density distribution. We find that for $beta > 1$, the continuum of a typical OB supergiant can indeed be contaminated with thermal wind emission, protect{it even at optical wavelengths}. The strong increase in the optical wind emission is dominantly produced by free-bound processes.

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Comments:

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