

NONRADIAL PULSATIONS AND THE Be PHENOMENON

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Abstract

Over the last three years I have obtained about 2000 spectra of a sample of 25 rapidly rotating Bn and Be stars. All but two of the program stars show obvious line-profile variations due to non-radial oscillations. The non-emission stars are each pulsating in one or two short-period high-degree ($\ell = 4$ to 10) modes, while the Be stars are in all cases pulsating in a long-period $\ell = 2$ mode, and often in a short-period high- ℓ mode as well. The amplitude of the pulsations in several stars (λ Eri, o And, ζ Oph, and 2 Vul) is correlated with the occurrence of Be outbursts. The amplitude of the pulsations is largest before the outbursts, declines slowly during the emission phases to a fraction of its previous amplitude, and then slowly recovers to its previous amplitude, a few months before the onset of the next outburst. The correspondence between the presence of a long-period $\ell = 2$ mode and H α emission in rapidly rotating B stars strongly suggests that non-radial pulsation and rapid rotation are the essential components which enable single early B stars to become Be stars. The time scale between Be outbursts probably reflects the relaxation oscillation cycle of the $\ell = 2$ mode excitation and damping.