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THE DISCOVERY OF Hα EMISSION IN V373 Cas

The eclipsing binary star V373 Cas (HD 224151; V=5.9, ΔV=0.1; P=$13^{d}.41921$; B0.5II +B4III) is a relatively poorly investigated object. Hill and Fisher (1987) studied the orbit and physical parameters of V373 Cas. They used their high S/N ratio spectroscopic observations in the blue spectral region and incomplete light curve showing large distortion obtained by Lynds (1959). We included V373 Cas in our program of the double B stars with purpose to determine its evolutionary status, atmospheric parameters, helium abundance and matter flows. The results of these complex investigations will be published later and now we report the discovery of emission in Hα and HeI λ6678 lines and its variability during the orbital period.

Our spectral, photometric and polarimetric observations were carried out during 1994. The spectral data were obtained using coudé spectrograph with GEC CCD of the 2.6 m telescope of Crimean Astrophysical Observatory. The spectral resolution were 25000 and 30000 for Hα and HeI, respectively. The S/N ratio was 100–200. The photometric and polarimetric data were obtained at the 1.25 m telescope with the UBVRI five channel photometer–polarimeter.

Figures 1 and 2 illustrate some of typical profiles of HeI and Hα lines for the different orbital phases. The phases φ have been calculated according to the ephemeris of Hill and Fisher (1987). From Fig. 1 one can see that the primary (the more massive star–A) and the secondary (the less massive star–B) HeI components were observed near the elongations ($\varphi = 0.07$ and $\varphi = 0.35$). One should pay attention to the weak red emission component in HeI profile at the phase 0.07 (Fig. 1). From Fig. 2 one can see that the Hα profile has a more composite structure; there are absorption and emission components and they are variable during the orbital period. The Hβ profile has been observed by us and by Hill and Fisher (1987), but no emission was found in this line. The presence of the emission may be considered as an evidence of the mass exchange between the components, and it is more probably that the matter outflows from the primary. Our considerations are similar to those of Hill and Fisher (1987), namely, the primary component is close to, or at, the Roche lobe at periastron, and there is non–synchronism for both components.

Our photometric observations have shown the low amplitude variability ($0^{m}.10$) in all five passbands. We also found the unexpectedly large (0.5%) phase–locked polarimetric variability which may be considered as an additional evidence for the existence of the circumstellar gas.

We hope that our complex observations of V373 Cas together with the earlier results of the other authors will allow us to understand better the nature of the binaries which are on the short duration stage of the mass loss from more massive primary.

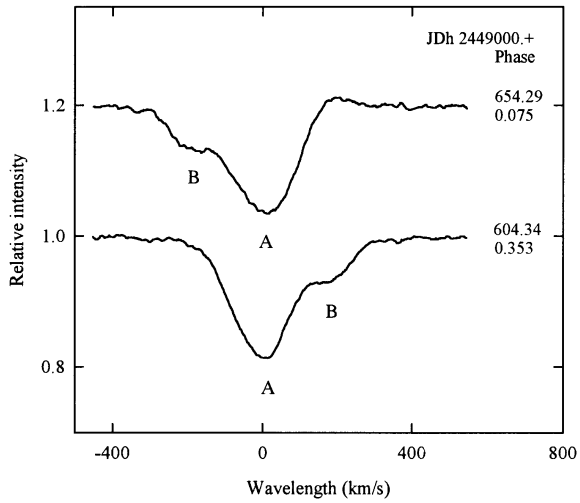

Figure 1. HeI λ6678 line profiles.

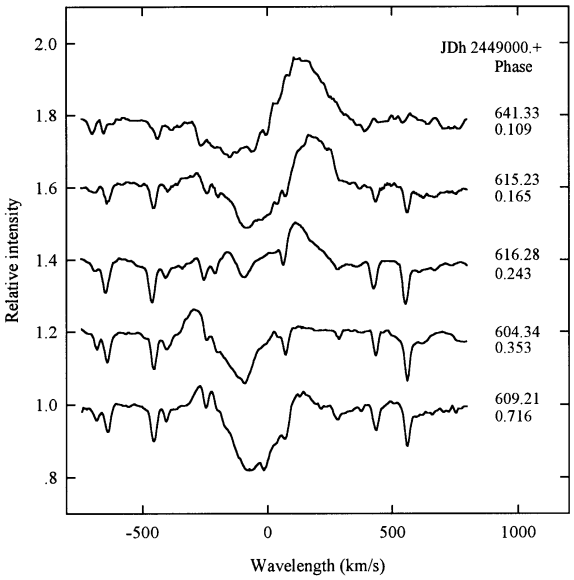

Figure 2. Hα line profiles. The sharp absorptions are the telluric H_2O lines.

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