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Author: Dr. Bayram Rustamov
Baku State University, Azerbaijan, bayram_rustam@yahoo.com

Dr. Khidir Mikailov
Baku State University, Azerbaijan, mikailov.kh@gmail.com
Dr. Kamala Alisheva
Baku State University, Azerbaijan, kamalaalisheva@bsu.edu.az
Dr. Sabina Mammadova
Shamakhy Astrophysical Observatory, Azerbaijan, sabonaSHAO@gmail.com
Dr. Vusala Aliyeva
Shamakhy Astrophysical Observatory, Azerbaijan, Vusala.elizade@mail.ru

CIRCUMSTELLAR ACTIVITY IN AE/BE HERBIG STARS: HD 31648 AND HD 53367

Abstract

The aim of this paper is to study the observed peculiarities of the star's emission in the regimes of accretion and stellar wind, based on homogeneous spectral data from two young stars of the Ae/Be Herbig type: HD31648 and HD53367. Spectral observations were carried out at the Cassegrain focus of the 2-meter telescope at the Shamakhy Astrophysical Observatory, named after N. Tusi, using the Shamakhy Fiber Echelle Spectrograph and the CCD matrix with 40964096 pixels. The spectral resolution was R = 28000, and the wavelength range was 3800-8000 Å. The reduction of echelle spectra was carried out using the standard method and the new version of the DECH 30 program. For the analysis, the following features were selected from the spectrum of the stars: the lines of the Balmer series of hydrogen (mainly Hα and Hβ); the resonance doublet of sodium (NaI D1,2); neutral helium (HeI 5876Å); and the lines of ionized iron FeII42. To refine the period of possible binarity of the star HD 53367, absorption lines of purely photospheric origin were also studied in its spectrum. During our spectral observations, the profiles of the selected lines (Hα and Hβ, NaID1,2) in the spectrum of the star HD 31648 had a P Cyg-type profile, indicating the dominant role of the stellar wind (source of matter) in the formation of these lines. On the night of December 21, 2019, the profiles of the same lines changed synchronously in the spectrum of the star HD31648. A powerful mass ejection occurred from the star's surface on this night, covering the entire region of formation of these lines. The shape of the Hα line profiles in the spectra of the star HD53367 indicates the presence of an accretion disk around the star. During the formation of Hα lines, the dominant role on the dates of 12-14 and 12-21 in 2019 belongs to rotation (V/R1), and on the dates of 01-25-2019 and 01-17-2020, an accretion of matter onto the surface of the star. The measured radial velocities of the photospheric lines in the spectrum of the star HD53367 fit well to the curve of radial velocities folded with a period of P=183.34 days proposed in the literature.