

RESULTS OF LONG-TERM OBSERVATIONS OF EARLY-TYPE STARS WITH CIRCUMSTELLAR SHELLS

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ABSTRACT. The results of UBVRIJK photometric, RI polarimetric, and spectral observations of three Herbig Be stars MWC 137, MWC 297, and MWC 1080 are presented. Brightness variability and spectral features are analyzed. Evidences of cool star presence in MWC 297 are reported. Characteristics of central stars and their shells are estimated.

Key words: Stars: emission-line, circumstellar matter, photometric variability, binaries.

Determination of physical characteristics of stars with gas and dust shells is an important and difficult problem of modern astrophysics. This paper is devoted to the complex study of Herbig Be stars MWC 137, MWC 297, and MWC 1080 still having an uncertain status. All the objects have bright hydrogen and Fe II emissions in their spectra. Brightness variability has been studied only for MWC 1080 (Grankin et al., 1992). Photometric UBVRIJK observations were made with the 1-m telescope of the Astrophysical Institute (Assy) using the photometer-polarimeter FP3U (Bergner et al. 1988) between 1984 and 1992. It was obtained about 30 observations of MWC 137 and about 50 of MWC 297 and MWC 1080. One of the authors (A.M.) obtained several spectra of each star in 1989–1991 in the range of 4000–7000 Å using the scanner of the 6-m telescope of RAS. The dispersion was 50 and 100 Å/mm. We have detected some absorption features typical for late-type stars in the spectrum of MWC 297 and that of early-

type in MWC 137. There were no evidences of absorptions in the spectrum of MWC 1080. Photometric observations have shown that all the objects have brightness variability. Its amplitude for MWC 137 is about 0.4 mag. in the optics and about 0.6 in the near-IR. We have also detected the quasi-period of 4.07 days.

The mean polarization in the R-band was about 6%. The mean brightness level of MWC 297 was decreased by 0.4 mag. between 1984 and 1989. Detailed analysis of its variability shows some maxima and minima with possible quasi-period of nearly 25 d. Brightness of MWC 1080 changed between $V = 11.2$ and 11.8 mag without evidences of periodicity.

Its polarization increased between 1985 and 1992 from 1.5–2 to 2.5–3.5%. We suppose that MWC 297 may be a binary system with early-B and early-K components surrounded by a strong gas and dust shell. This model can explain its high reddening together with the Balmer decrement and SED in the wide spectral range. MWC 137 seems to be a young early-B star with an accretion disk (which explains a high radio flux from the object and the radio spectrum). MWC 1080 is probably an early-B supergiant just after the stage of Main Sequence.

References

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