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AB Cas revisited

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AB Cas is a very good example of an eclipsing binary system where the light curves show simultaneously two types of variation: binarity of the Algol-type and pulsation of δ Sct-type. In fact, this system belongs to the very small group of "A-F spectral type main-sequence mass-accreting pulsating stars in semi-detached Algol-type eclipsing binary systems" proposed by Mkrtichian et al. (2002).

In the case of AB Cas, the orbital period is of P_{orb}=1.^{d}3668 with eclipse depths of ΔV$\sim$1.^{m}6 and 0.^{m}1 (primary and secondary, respectively), whereas the main pulsational period is P_{pul}=0.^{d}0583 with an amplitude of about 0.^{m}05 (from peak to peak). The most complete study was carried out by Rodríguez et al. (1998) by using simultaneous *uvby* observations collected from 1987 to 1988. They found only one pulsational frequency in the amplitude spectra which was suggested as radial in the fundamental mode.

New observations have been carried out during the years 1998-1999 with simultaneous *uvby* photometry using the six-channel *uvby*β spectrograph photometer attached to the 90 cm telescope at Sierra Nevada Observatory, Spain. About 90 hours of data were collected and nearly all of the orbital phases were covered twice. The short period oscillations are directly seen in the collected light curves in all the orbital phases, except during the primary eclipses.

In order to analyse the pulsational behaviour of the primary component, the binary contribution was first removed from the light curves. For this purpose, the orbital solution obtained by Rodríguez et al. (1998) was adopted as a preliminary solution. Now, the pulsation is also visible during the primary minima as confirmation that the eclipse is partial. Then, the residuals O-C were analysed and, similar to that paper, they show some disturbances during the orbital phases corresponding to the primary eclipses. They will be investigated in more detail when a definitive binary solution has been obtained.

Thus, phases corresponding to the primary eclipses were not taken into account in our frequency analysis. The data sets corresponding to each year 1998 and 1999 were analysed separately. Our results indicate the existence of a main frequency f_1=17.1564 cd^{-1} in very good agreement with that found by Rodríguez et al. (1998) with data collected one decade before. Within the observational uncertainties, the phase shifts for data collected in the different filters agree well with those reported in that paper. Nevertheless, it seems that the amplitude of f_1 presents changes from season to season and there are also some insights on the existence of a secondary frequency at f_2=14.961 cd^{-1}.

References

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