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A SEASONAL LIGHT CURVE AND NEW EPHEMERIS OF VW CEPHEI

VW Cephei (HD 197433 = BD +75°752 = SAO 9828) is a famous, popular and well-studied EW-type eclipsing binary - its popularity is well demonstrated by the fact that this star has been the most frequently studied object dealt with in the IBVS since 1961. VW Cep does deserve this particular interest, because it shows quite complex variations in its light curve. The main light variation is a usual eclipsing light curve of contact binaries - the primary minimum is due to occultation, so this is a W-type system according to Binnendijk's (1970) definition.

There are some changing perturbations superimposed on the eclipsing light curve - these are probably due to the intensive surface activity of the primary, more massive component, which is a usual phenomenon among the W-type W UMa-systems (e.g. Rucinski, 1985). The observed time scale of the perturbations extends from 24 hours (Kreiner & Winiarski, 1981) to 44 years (Karimie, 1983). The study of the short-time-scale changes was the aim of an international observational campaign organized by P. Hendry (Univ. of Toronto, Canada) and one of us (J.V.) in August, 1992. The analysis of those observations is currently underway, a preliminary result indicates a changing asymmetry of the light curve on a time scale of about one week.

As far as the long period modulations are concerned, the activity maximum was in 1986, according to e.g. Bradstreet & Guinan (1988), then it decreased considerably after 1988-89. The 6-8 year-long cycle length proposed by Bradstreet & Guinan indicates that the next maximum is expected to occur in 1992-94. Therefore we decided to monitor the behavior of the system during this period.

We measured the system photoelectrically on 3 nights in August and September, 1993 at Konkoly Observatory with the 50 cm Cassegrain telescope installed at Piskéstető Mountain, and at Szeged Observatory, Szeged, Hungary, with a 40 cm Cassegrain reflector. A complete photoelectric light curve in Johnson V and B bands was obtained and it is presented in Figure 1. The comparison star was HD 199476 = SAO 9899 which was used previously by many observers. Table 1 contains the heliocentric times of minima calculated from parabolic least-squares fit to the bottom of the minima. The asymmetries of the light curves do not exceed 0.02 mag indicating that VW Cep is still in the less active phase.

Table 1

T Min (Hel.J.D.)	type	O-C (days)
49213.465	I	-0.089
49252.4306	I	-0.0879
49253.4050	II	-0.0877

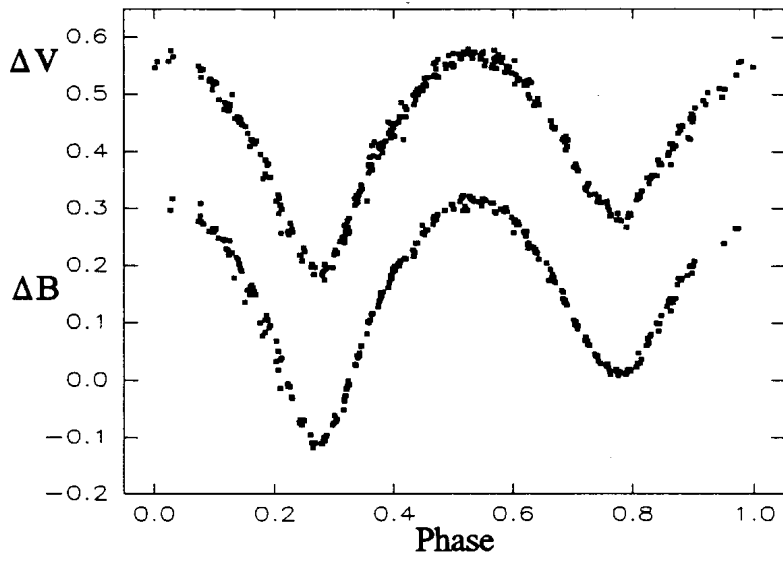


Figure 1

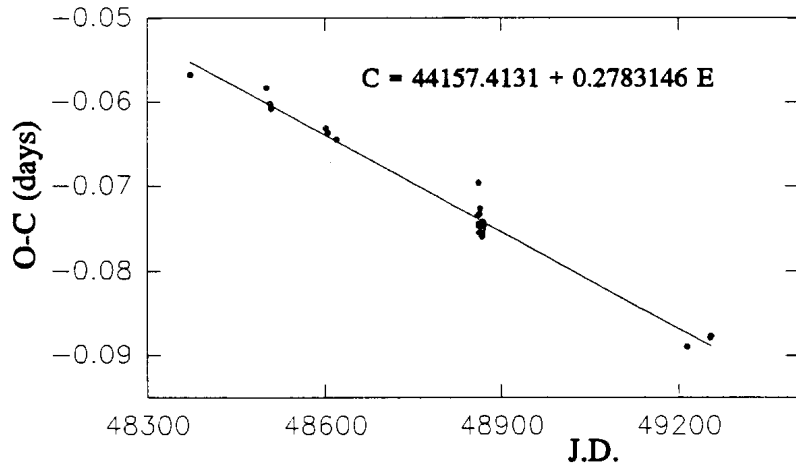


Figure 2

Table 1 also contains the O–C values calculated from the ephemeris given in the GCVS. In Figure 2 we plotted our new times of minima on the O–C diagram (based on the most recent measurements available for us including the data from the 1992 campaign which will be published in a separate paper). The O–C of secondary minimum was calculated so that its cycle number (E) was half-integer.

The O–C curve in Figure 2 can be approximated with a straight line indicating a nearly constant period (smaller than its previous value) during the past few years. From the slope of the fitted line the current photometric period of VW Cep can be calculated and the following ephemeris has been derived:

$$\text{Min I Hel J.D.} = 2449252.4306 + 0.2783040 \times E \quad (1)$$

which can be used for predicting new times of primary minima in the next couple of years.

Since VW Cep is a member of a triple system (Hershey, 1975), its period is modulated by the light-time effect. A detailed analysis of the period variation has been presented recently by Lloyd, Watson & Pickard (1992). They derived a photometric period of 0.2783099 day which agrees quite well with the new period presented above.

The list of individual observations is available via e-mail from vinko@sol.cc.jate.u-szeged.hu (Internet).

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J. VINKÓ
 Dept. of Optics
 J. GÁL, K. SZATMÁRY, L. KISS
 Dept. of Experimental Physics
 JATE University
 Szeged, Dóm tér 9
 H-6720 Hungary

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