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PHOTOELECTRIC LIGHT CURVES OF VW CEPHEI

VW Cephei is a W UMa type eclipsing system which has both a variable period and a variable light curve (Kwee, 1966a). Many authors have looked for a long term and a short term periodic variation of the period. The long term variation was generally interpreted as due either to the presence of a third component or to dynamical interactions between the two components. The short term variations of the period of VW Cep have been studied by Kwee (1966a,b). He found periodic displacements of the minimum times which are connected with a clearly visible variation of the height of the two maxima. Kwee interpreted this variation as due to an inhomogeneous cloud of circumstellar absorbing material revolving at a very small distance around the system with a period about 3.5% longer than the period of the component stars.

During a program of photoelectric observations of eclipsing binary stars a new light curve (Figure 1) of VW Cep in two colours (B and V) was obtained on July 20-23, 1979.

The Observations.

The observations were made with a 48-inch Cassegrain reflector (Contopoulos and Banos, 1976) and a two beam multi-mode photometer (Goudis and Meaburn, 1973). The two intermediate pass-band filters used were selected to be in close accordance with the standard U,B,V colour system. As comparison star we used BD $+74^{\circ}889$, as check star BD $+75^{\circ}726$. The observations of July 20-21 and those of July 22-23 cover the whole light curve, while those of July 21-22 cover the phase interval from 0.0 to 0.65 and from 0.87 to 1. The following ephemeris (Cristescu, 1978) was used for the reductions of the observations

$$\text{Min I} = \text{JD Hel } 2443448.2663+0.2783176 \cdot E. \quad (1)$$

A total of 116 B and 116 V observations were obtained (each observation consists of two individual measurements).

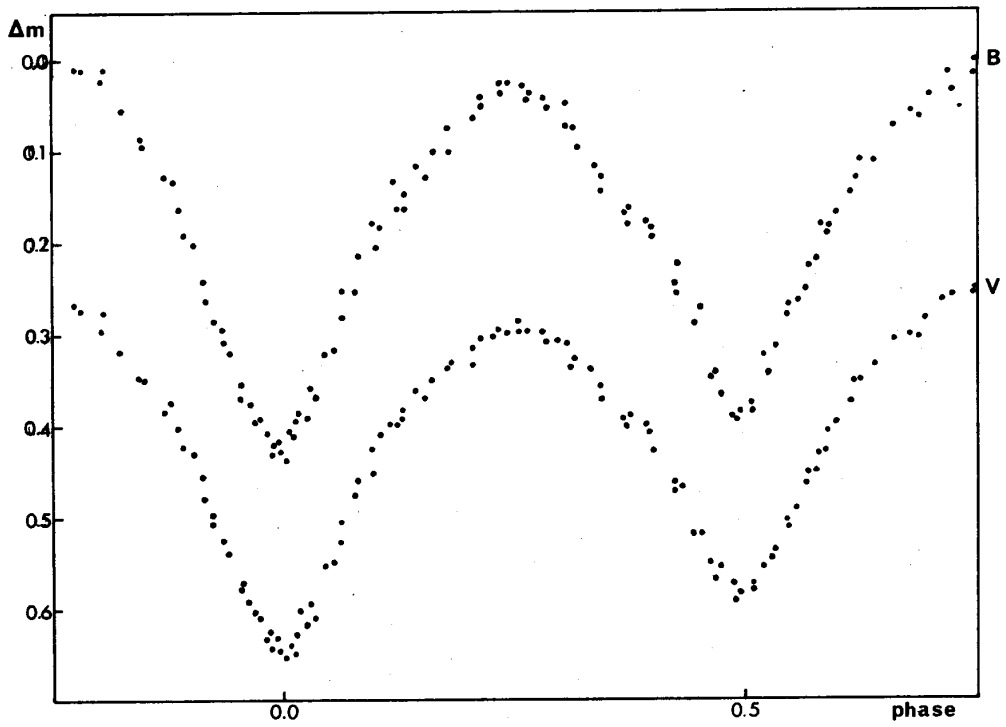

Figure 1. The B and V light curves of VW Cep.

Times of Minima.

One of the conspicuous features of the light curve of VW Cep is the variable but very pronounced asymmetries which appear regularly at both minima. Because of the asymmetric minima, the parabolic parts of the light curve around each minimum (van't Veer, 1973) have been used to determine the times of minima. Six epochs of minimum light, given in Table I, were determined by the method of bisecting chords connecting points of equal magnitude on the opposing branches to find the temporal mean.

Table I Observed Minima of VW Cep

HJD 2440000+	$(O-C)_1$	$(O-C)_2$	Rem.
4075.3151	-0.0007	-0.0982	I
4075.4541	-0.0009	-0.0984	II
4076.4284	-0.0007	-0.0982	I
4076.5673	-0.0010	-0.0985	II
4077.4028	-0.0009	-0.0979	II
4077.5415	-0.0004	-0.0984	I

The $(O-C)_1$ values were computed using the ephemeris given by equation (1), while the $(O-C)_2$ values were calculated according to van't Veer's (1973) ephemeris

$$\text{Min I} = \text{JD Hel } 2433898.4410+0.27831793\cdot E \quad (2)$$

The so calculated $(O-C)_2$ values are in accordance with van't Veer's (1973) O-C diagram completed by Hopp et al. (1979) with later determinations. That diagram clearly shows that the period shortening still goes on.

The Light Curve.

According to Schmidt and Schrick (1955) the following three values were determined from our observations to descibe the variability of the light curve around the extrema

	B	V
$\Delta m_1 = m_{minI} - m_{minII}$	+0.042	+0.060
$\Delta m_2 = m_{maxI} - m_{minII}$	-0.385	-0.332
$\Delta m_3 = m_{maxII} - m_{minII}$	-0.358	-0.297

The heights of the two maxima are not equal. Their difference is about $0^m.035$ and $0^m.030$ for the V and B bands, respectively. A shoulder appears at about $0^p.65$ (Hopp et al.,1979) in the V-band,

while another one is present at $0^{p}.11$ in both bands. An unusual scatter in B and V is observed around the primary minimum.

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