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NEW PHOTOELECTRIC LIGHT CURVES OF VW CEPHEI

VW Cep (BD + 75°752) is one of the peculiar eclipsing binaries of W UMa type. Kwee (1966) noted that this star has both variable period and variable light curves. He found periodic displacements of minimum times which were connected with clearly visible variations in the light curve and were generally interpreted due to an inhomogeneous cloud of circumstellar absorbing material revolving at a very small distance around the system with a period slightly different from the eclipsing period.

Van't Veer (1973) attributed the changes in the period of VW Cephei to the presence of local temporary emissions. A detailed interpretation of the disturbances of VW Cep by a hot spot and a shell is presented by Pustylnik and Sorgsepp (1976).

Due to the peculiarities of VW Cep, it has attracted the attention of many investigators. So, many photoelectric observations have been taken for the star and consequently many light curves are obtained and hence several ephemerides are deduced for the star.

In an attempt to define the long-term variations in both the period and the shape of the light-curve, extensive photoelectric observations of VW Cep were made in two colours B and V by the 74 in. reflector at Kottamia Observatory, Egypt, on the first week of August 1981.

The observations were carried out by a one beam photoelectric photometer which was attached at the f/18 cassegrain focus. Standard B and V filters with EMI 9558 B tube cooled by propeller fan, were used throughout all the observations. The amplified output of the tube was fed into a Brown recorder. The time of observations was estimated from the starting point and the mean moving speed of the strip chart recorder.

During the observations many standard stars of known standard magnitudes from B. Iriarte et al. 's catalogues, were frequently observed to determine

the extinction coefficients, scale factors and zero point of the equipment. These parameters were used to deduce the magnitudes of the variable and comparison stars. The comparison star was BD $+75^{\circ}765$ which has been used before by many investigators. The variable VW Cep was observed more or less continuously through B and V filters, with only occasional measurements of the comparison star BD $+75^{\circ}765$. During the observations, the nights were of good photometric quality.

Our individual observations of VW Cep will be deposited in the Archives of Comm. 27.

From the individual observations five light curves for primary and secondary eclipses were obtained. Epochs of minimum light were determined by the methods of "bisecting chords", connecting points of equal magnitude on the opposing branches near the minima to find temporal mean of epochs at minimum light. These are listed in Table I together with their O-C residuals.

Table I

Epochs of Minimum Light

H.J.D. 244 4820 +	Min.	Filter	O-C	E
1.4851	I	V	-0.0002	4934
1.4848	I	B	-0.0005	4934
2.4588	II	V	-0.0006	4937.5
2.4588	II	B	-0.0005	4937.5
3.4322	I	V	-0.0014	4941
3.4327	I	B	-0.0009	4941
4.4064	II	V	-0.0013	4944.5
4.4068	II	B	-0.0009	4944.5
6.4940	I	V	-0.0010	4952
6.4941	I	B	-0.0009	4952

The O-Cs were computed from the following ephemerides given by Cristescu (1978):

$$\text{Min I} = \text{J.D.Hel. } 244\ 3448.2663 + 0.2783176\ E$$

These ephemerides were also used for the reductions of the observations to give mean light curves for the B and V measurements.

Three primary and two secondary eclipse curves were obtained from the individual B and V observations for VW Cep which are presented in this investigation.

Table II contains informations about these light curves; Min I and Min II refer to the primary and secondary minima, respectively; Max I and Max II refer to the maxima following the primary and secondary minima, respectively, B and V are the observed magnitude differences, in the sense variable minus comparison star.

Table II

Comparison of Successive Light Curves

	B			V		
	Min I	Max I	MinI-MaxI	Min I	Max I	MinI-MaxI
Curve 1	0.785	0.370	0.415	0.986	0.505	0.481
Curve 3	0.770	0.380	0.390	0.985	0.505	0.480
Curve 5	0.780	0.320	0.460	0.986	0.510	0.476
	Min II	Max II	MinII-MaxII	Min II	Max II	MinII-MaxII
Curve 2	0.655	0.346	0.309	0.870	0.490	0.380
Curve 4	0.660	0.325	0.355	0.865	0.475	0.390

Table II shows that Max I is always higher than Max II, this indicates that outside the eclipse the VW Cep system is somewhat brighter, when the larger and hotter component is advancing while the smaller and cooler component is receding, than in the case of converse position. Also it can be noticed from Table II that the successive light curves shown here have different depths. This deflects the fact that VW Cep has a variable light curve. At the same time, the differences in O-C values for the estimated epochs of minima show that the star VW Cep has a variable period.

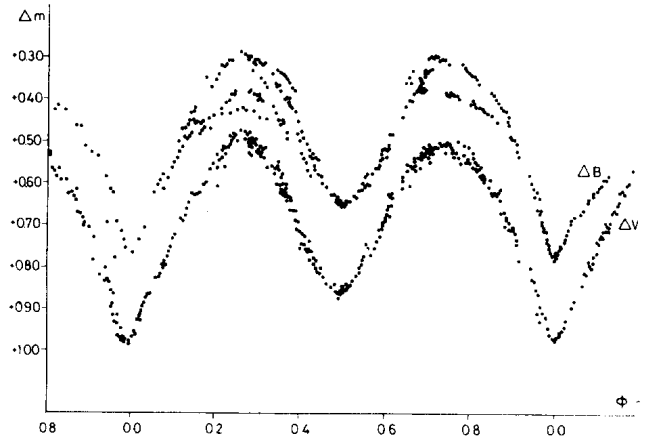

Figure 1 Light curve of VW Cep

So it is important to stress that the period behaviour of VW Cep must be followed and more light curves must be observed in order to give the comparison between the earlier and newer observations of this star more and more significance.

From the individual observations of this work a complete light curve has been obtained and it is shown in Figure 1. Ephemerides of Cristescu (1978) have been used to estimate the phase of each point on the light curve.

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References:

Cristescu, C., 1978: I.B.V.S. No.1383.
Kwee, K.K., 1966: Bull. Astron. Inst. Neth. 18, 448.
Pustylnik, I. and Sorgsepp, L., 1976: Acta Astron. 26, 319.
van't Veer, F., 1973: Astron. and Astrophys. 26, 357.