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A NEW B V LIGHTCURVE OF THE ECLIPSING BINARY VW CEPHEI

The W UMa star VW Cep is well known to have both a variable period and a variable lightcurve (Kwee, 1966). The older observations show a correlation between the variability of the period and the longtime activities of the lightcurve. VW Cep has a similar period and spectral-type to  $\iota$  44 Boo which is also well known for variable period and lightcurve disturbances (see, for example, Duerbeck, 1978). For both stars it was suspected that there exist cycles or periods for the observed lightcurve changings. A detailed interpretation of the disturbances of VW Cep by a hot spot and a shell is presented by Pustylnik and Sorgsepp (1976). To carry on the observational work, a new lightcurve of VW Cep was observed on Sept. 23/24 and Sept. 24/25, 1977.

1. The observations

The measurements were taken with the 75 cm telescope of the Wilhelm-Foerster Observatory, Berlin, an uncooled RCA 1P21 multiplier, an usual amplifier and Schott filters BG12+GG13 for the B-band and GG11 for the V-band. As comparison star served BD+75<sup>o</sup>765(K2) = A, as check star BD+75<sup>o</sup>755(GO) = B. Schmidt and Schrick (1955) found that A may be slowly variable, but the difference A-B was found to be constant at  $\Delta V = -2^m.143 \pm 0^m.008$  and  $\Delta B = -1^m.499 \pm 0^m.007$  between the two nights. The observations of both nights are drawn in Fig.1 and no systematic differences are found. The observations of Sept. 23/24 cover a primary minimum, the observations of Sept. 24/25 cover the interval from  $0.1^P$  to  $0.95^P$ . A total of 162 V observations and 146 B observations were obtained.

2. The period

The times of the primary and secondary minimum were determined by Pogson's method:

Min I <sub>o</sub>	2443	410 <sup>d</sup> .4180	$\pm 0^d.0006$	E :	34177	O-C:	$-0^d.0949$
Min II <sub>o</sub>		411.3952	$\pm 0.0007$		34180,5		-0.0918

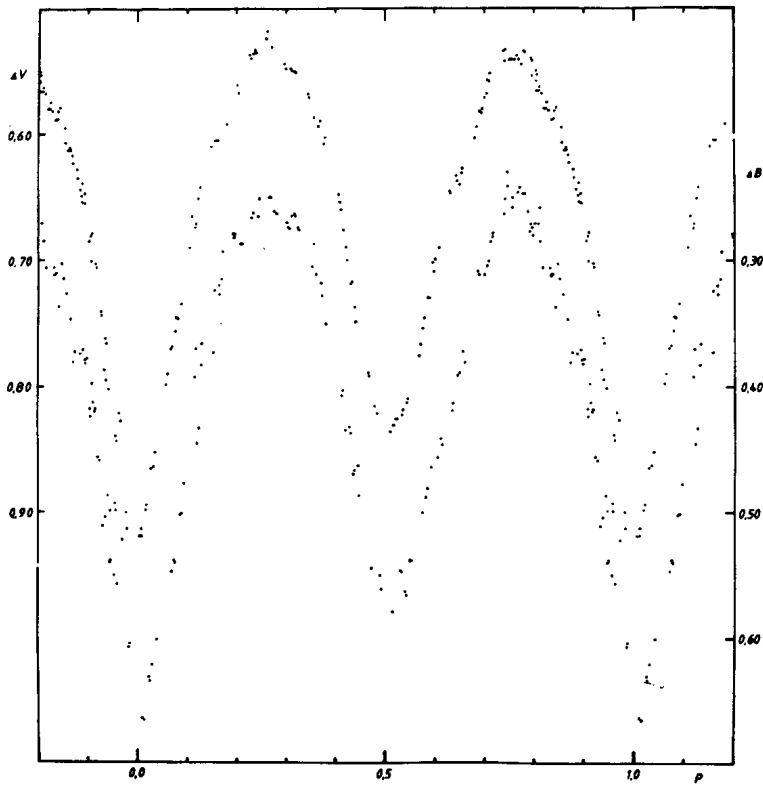


Fig. 1: B and V lightcurve of VW Cep in the sense VW-BD+75°765

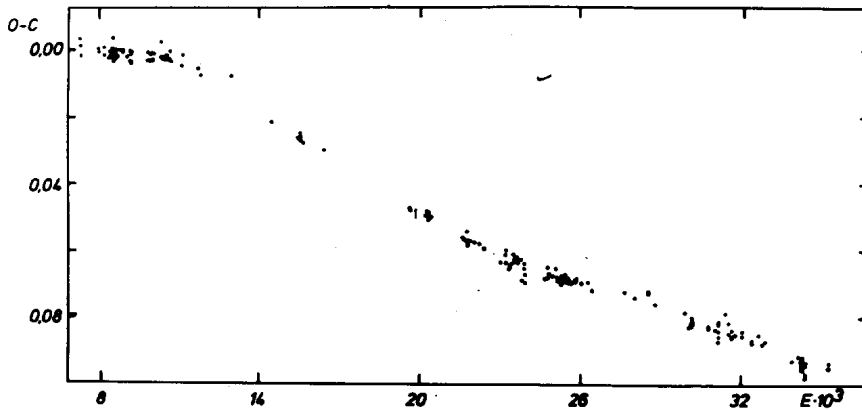


Fig. 2: O-C diagram of VW Cep according to the ephemeris of van't Veer.

Table 1

## Minimum determinations of VW Cep

Epoch	Minimum time <sub>0</sub>	O-C	Reference
25169	2440903.3557	-0.0693	Pohl, E. Kizilirmak, A. 1972-IBVS 647
26021	1140.4822:	-0.0697:	
26261	1207.277 :	-0.071 :	
26297	1217.298 :	-0.070 :	
26408,5	1248.328 :	-0.072 :	
27659	1596.364	-0.073	Kizilirmak, A. Pohl, E. 1974-IBVS 937
27953,5	1678.327	-0.074	
28442,5	1814.426	-0.073	
28496,5	1829.456	-0.072	
29071	1989.344	-0.078	
31489,5	2662.4519	-0.0816	Patkós, L., 1975-IBVS 1065
31504	2666.4844	-0.0847	
31683	2716.3027	-0.0853	Branczewicz, H., Kreiner, J. M., 1976- IBVS 1119
30670	2434.3686	-0.0833	Pohl, E. Kizilirmak, A. 1976-IBVS 1163
30724	2449.3985	-0.0826	
31015	2530.388 :	-0.084 :	
31108,5	2556.407	-0.087	
31109	2556.548	-0.086	
31130	2562.397	-0.081	
31288,5	2606.513 :	-0.079 :	
31550,5	2679.4272	-0.0837	Patkós, L., 1976-IBVS 1200
31554	2680.3996	-0.0854	
31601	2693.4799	-0.0860	
32664,5	2989.4692	-0.0878	
31938,5	2787.4133	-0.0849	Pohl, E. Kizilirmak, A. 1977-IBVS 1358
32301,5	2888.4409:	-0.0867:	
32391,5	2913.4887:	-0.0875:	
32883,5	3050.4218	-0.0869	
28735	1895.8309	-0.0758	Scarfe, C. D. Barlow, D. J., 1979-
29823,5	2198.7773	-0.0785	IBVS 1379
30031	2256.8019	-0.0832	
30075	2268.7702	-0.0825	
30078,5	2269.7467	-0.0802	
30154	2290.7587	-0.0812	
30154,5	2290.8973	-0.0817	
31113,5	2557.8039	-0.0820	
31135	2563.7854	-0.0843	
32622,5	2977.7824	-0.0853	
34137	3399.2870	-0.0932	Cristescu, C., 1978-IBVS 1383
34202	3417.3786	-0.0922	
34216	3421.2737	-0.0936	
34216,5	3421.4126	-0.0939	
34227	3424.3332	-0.0956	
34270	3436.3029	-0.0936	
34288	3441.3090	-0.0972	
34313	3448.2663	-0.0978	
34352,5	3459.2635	-0.0942	
35140,5	3678.5786	-0.0936	Niarchos, P. G., 1979-IBVS 1576
35144	3679.5510	-0.0953	
35148	3680.6646	-0.0950	
33825	3312.4522	-0.0928	Ebersberger, J., Pohl, E., Kizilirmak,
34062	3378.4148	-0.0915	A., 1978-IBVS 1449
34177	3410.4180	-0.0949	this paper
34180,5	3411.3952	-0.0918	

The given values of minima times are means of the value obtained from the B and V lightcurve. The given O-C value for Min II is calculated under the premises that Min II lies at  $0^P.5$ . The ephemeris are adopted from van't Veer (1973):

$$\text{Min } I_0 = \text{J.D. } 2433\ 898^d.4410 + 0^d.27831793 \cdot E.$$

Fig. 2 shows van't Veer's O-C diagram completed by minima determinations given in Table 1. The figure clearly shows that the period shortening still goes on. Kreiner (1977) showed that all good observed W UMA variable stars change their periods in rather short time and then remain constant. Using all minima of Table 1 with  $E > 28000$ , one can find by a linear last square fit the actual value of the photometric period to be  $0^d.27831481$  or 0.270 seconds less than van't Veer's value.

### 3. The lightcurve

Schmidt and Schrick determined three values to describe the lightcurve variability around the extrema:

$$\begin{array}{lll} \Delta 1^m = m_{\text{Min I}} - m_{\text{Min II}} & B + 0^m.10 & V + 0^m.086 \\ \Delta 2^m = m_{\text{Max I}} - m_{\text{Min II}} & - 0.31 & - 0.312 \\ \Delta 3^m = m_{\text{Max II}} - m_{\text{Min II}} & - 0.33 & - 0.296 \end{array}$$

The actual values from our observations are tabulated. A shoulder appears at  $0^P.64$  in the V-band, but it is not detected in the B-band. In the light curve of i Boo and W Uma (Duerbeck), shoulders are found which are interpreted by Breinhorst and Reinhardt (1974) as light absorption of a gaseous stream. Except the pronounced feature at  $0^P.64$  in the V-band, no similar disturbances are detected. An unusual great scatter in B and V is observed around  $0^P.95$ . A small asymmetry of Min II may be possible in the bottom of the V lightcurve.

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### References:

- Breinhorst, R.A., Reinhardt, M., 1974 - Acta Astron. 24, 377  
 Duerbeck, H.W., 1978 - Astron. Astrophys. 32, 361  
 Kwee, K.K., 1966 - Bull. Astron. Inst. Netherl. 18, 448  
 Kreiner, J.M., 1977, - in: Kippenhahn, R., Rahe, J., Strohmeier, W.,  
 Veröff. Remeis Sternw. Bd. XI Nr. 121  
 Pustyl'nik, I., Sorgsepp, L., 1976 - Acta Astron. 26, 319  
 Schmidt, H., Schrick, K.W., 1955 - Zeitschrift f. Astrophys. 37, 73  
 van't Veer, F., 1973 - Astron. Astrophys. 26, 357