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PHOTOMETRY OF THE ECLIPSING BINARY FK ORIONIS

The eclipsing binary FK Ori (=41.1934=HD 240601; m=11.8-13.8pg; Sp:A2) was discovered by Morgenroth (1934). He observed three moments of weakenings and then the variable was classified as an Algol type. The full light curve was obtained by Szafraniec (1974) by only visual method. No brightness decrease was observed at the secondary minimum. According to the GCVS the orbital period of the binary is changing and its ephemeris is

$$\text{Min I=HJD } 2445680.512+1^{d}.947529\times E \qquad (1)$$

Our UBVR photometric observations of FK Ori were obtained with the 0.6 m telescope at Mt. Maidanak in 1989/92. The comparison star BD+8°852 ($V=7^{m}.33$; $U-B=-0^{m}.27$; $B-V=-0^{m}.09$; $V-R=-0^{m}.05$; Sp:B9) and the check star BD+9°627 ($V=10^{m}.09$; $U-B=0^{m}.93$; $B-V=1^{m}.11$; $V-R=0^{m}.58$) were chosen. We determined the probable error of a single measurement of the variable to be $0^{m}.042$ in U, $0^{m}.009$ in B, $0^{m}.012$ in V and $0^{m}.020$ in R. 78 points in U and nearly 240 points in each BVR filter were made. We analyzed all published times of minima and calculated the following ephemeris:

$$\text{Min I=HJD } 2426988.565+1^{d}.9474226\times E+(61\pm 2)^{d}\times 10^{-10}\times E^{2} \qquad (2)$$
$$\pm 0.005\pm 0.0000028$$

The O−C residuals are listed in Table 1 and shown in Figure 1. The period of FK Ori increases at a rate of $0^{d}.00000115$ per year.

However, the times of minima after JD 2437500 are better described by the ephemeris from GCVS. We noted the residuals $(O-C)_1$ in the last but one column of the Table. Perhaps, the period change is uneven. The light curves of FK Ori in U, B, V, R are shown in Figure 2. The duration of the primary minimum is $0^{p}.14$ and the partial eclipse has been observed. The secondary minimum is very shallow and its duration is practically equal to the primary one.

We also observed the important details at the secondary minimum in U and B. The brightness of the star increased almost by $0^{m}.2$ in U and $0^{m}.1$ in B. These measurements were obtained in 1991. In 1992 most observations were made in BVR and we did not see any anomalies at these phases. In general the observations of the binary showed a wider scatter in 1991 than in any other years. Perhaps, a large hot spot was on the surface of the secondary component in 1991.

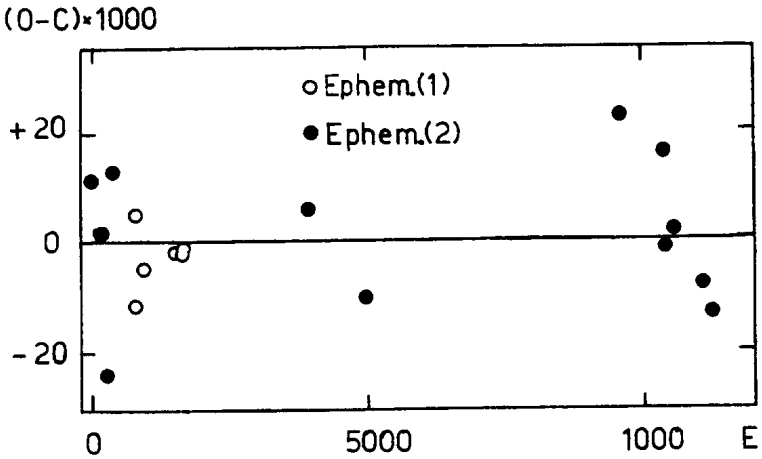

Figure 1. O−C diagram for FK Ori

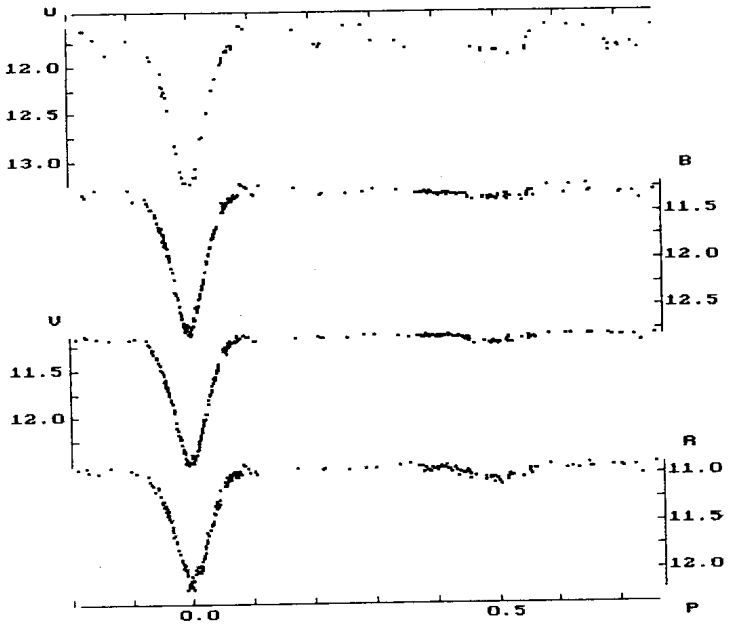

Figure 2. The light curves of FK Ori

Table 1. Times of minima of FK Ori

Observer	Type	HJD 2400000+	O−C	E	$(O-C)_1$	E_1
Morgenroth (1934)	pg	26988.576	$+0^d011$	0		
		27360.525	+0.002	191		
		27479.292	−0.024	252		
Piotrowski (1935)	v	27773.390	+0.013	403		
Szafraniec (1974)	v	33744.30	+0.05:	3469		
		34661.511	+0.006	3940		
		36630.394	−0.010	4951		
GCVS	pg	45680.512	+0.023	9598	0^d000	0
Manek (1992)	v	47207.363	−0.001	10382	−0.011	784
Dedoch (1992)	v	47207.380	+0.016	10382	+0.005	784
Borovichka (1992)	v	47542.345	+0.002	10554	−0.005	956
present paper	pe	48541.430	−0.008	11067	−0.002	1469
		48915.356	−0.013	11259	−0.002	1661
		48917.304	−0.013	12260	−0.001	1662

Table 2. Photometric values of FK Ori

	V	U−B	B−V	V−R
Max	11.15	+0.47	0.13	0.23
Min I	12.50	0.50	0.24	0.37
Min II	11.24	0.50	0.12	0.14

In Table 2 we list the average photometric characteristics of the curves.

Mamnun ZAKIROV
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