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THE OUTBURSTS OF THE DWARF NOVA FS AURIGAE

The variability of FS Aur (S 3946) was discovered by Hoffmeister (1949), who pointed out the rapid variations in the range 15.4^m and 16.2^m, outbursts to 14.4^m with the shortest interval between them 35^d. This value of the cycle length was recently confirmed by Geβner (1989). The strong emission lines of Hα-Hε and helium were found by Williams (1983). Howell and Szkody (1988) suspected the photometric period P = 97±10 minutes, which is characteristic for SU UMa-type stars.

The star was observed on 180 archive photographic plates of the Sternberg State Astronomical Institute. The comparison stars were linked to the BV sequence of Christian (1980) on 6 plates by using the Iris-photometer of the Sternberg Institute. They are shown in Fig.1. The value of σ_m corresponds to the mean-squared deviation from the mean. Normally $\sigma_m \leqslant 0.15^m$, but for the stars p, y, q the larger value of σ_m may argue for the possible brightness variations, and they were not used as comparison stars.

The histogram (Fig.2) is characteristic for Dwarf Novae, as well as the light curve, some parts of which are shown in Fig.3. The brightness changed from 14.0^m to 17.2^m (pg), its mean value $\langle m \rangle = 16.02^m$ and the mean-squared deviation $\sigma_m = 0.67^m$. For the observations in 'quiescent' state $m_{pg} > 15.0^m$, $\langle m \rangle = 16.22^m$, $\sigma_m = 0.39^m$. The 'brightenings' were observed on 20 plates corresponding to 12 outbursts. As one may see from the Table 1, the shortest time interval between the subsequent observed outbursts is equal

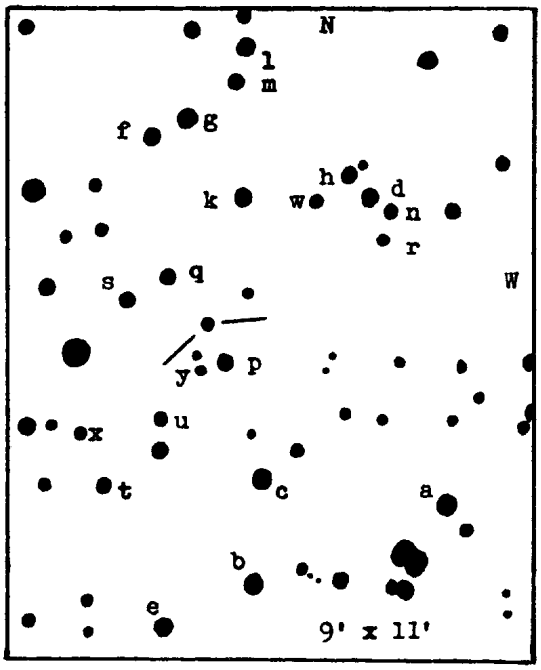

Fig. 1. Comparison stars for FS Aur

*	m_{pg}	σ_m	n
a	13.00	0.08	6
b	13.22	0.09	6
c	13.60	0.06	6
d	13.75	0.05	6
e	13.89	0.09	6
f	14.04	0.10	6
g	14.06	0.07	6
h	14.22	0.09	6
k	14.28	0.07	5
l	14.39	0.08	4
m	14.58	0.17	6
n	14.64	0.10	6
p	14.80	0.22	6
q	14.80	0.15	6
r	15.11	0.14	5
s	15.12	0.15	6
t	15.56	0.19	5
u	15.68	0.09	4
w	15.83	0.09	5
x	16.52	0.27	4
y	17.20	0.16	3

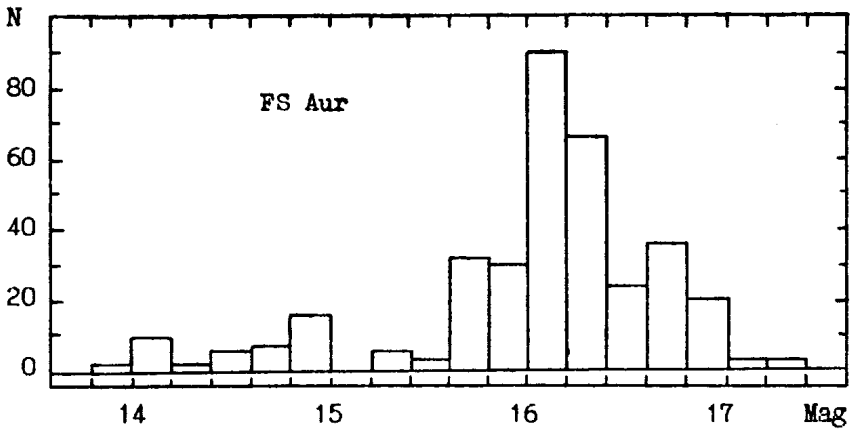

Fig. 2. The histogram for the brightness of FS Aurigae

to 24^d, two are twice longer (50^d and 53^d). Only one interval (33^d) derived from the Moscow plates is near the value 35^d, which was previously suspected by Hoffmeister (1949) and Geβner (1989). From these values one may suppose that the cycle length may be near $C \approx 12^d$. From the revised 'Amplitude-Cycle' relation derived by Richter and Brauer (1989), one may obtain the value $C \approx 13^d$ for the amplitude 2.2^m. Obviously, this statistical relationship corresponds to the relative accuracy ~100 per cent, thus such a value must be revised by the future observations.

The ascending branch of the light curve lasts no more than 1^d (Fig.3c), the descending branch lasts from 2^d (Fig.3c) to 3.5^d (Fig.3f). The value of the full outburst width $W=3.0^d$, which may be derived from the statistical 'W-P' relation of Gieger (1987), is in excellent agreement with our data. From the statistical relation between P and the rate of decline $\tau=dt/dm$ (van Paradijs, 1983), one may calculate the value of $\tau=0.95\pm0.21$ days/mag. For different outbursts we obtained the values of τ from 0.6 (Fig.3f) to 1.0 (Fig.3c). Thus the estimated characteristics agree with that observed in other Dwarf Novae with similar orbital periods.

However, no superoutbursts were detected (or recognized), which may be achieved, if $P \leqslant 2^h$. The amplitude of brightness variations during one night varies with characteristic time from $\sim 0.4^m$ at outburst to $\sim 0.9^m$ at 'quiescence'. However, the time resolution ~40 min is insufficient to study the possible orbital or superhump variability.

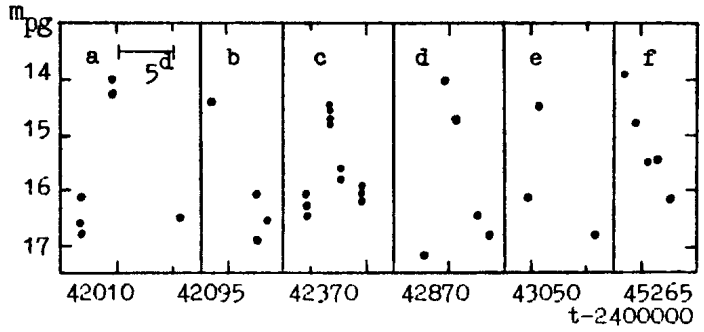

Fig. 3. The fragments of the light curve of FS Aur

Table I

The outbursts of FS Aurigae

26351.2	G+	38472.3	G+	42449.3	G	44900.6	14.1
26687.4	G	40148.5	G++	42812.4	14.9	44987.4	14.1
27046.5	G+	41322.4	G+	42836.3	15.0	45263.6	14.0
27424.3	G+	41390.3	G+	42869.3	14.1	45313.4	14.8
27459.4	G+	42009.5	14.0	43050.5	14.5	46147.4	G
27582.6	G+	42093.4	14.4	43161.5	14.6	46307.5	K13.5
27718.5	G	42336.5	14.6	44254.5	G	46335.6	K14.0
31530.4	G					46420.0	K14.7

Remarks: The (JD-2400000) of the observations near the outburst are given. G corresponds to the photographic observations of Geβner(1989) with 'normal' and 'larger' (G+) brightenings, K - to the visual estimates of Kinnunen (1985). The values without letter correspond to our observations.

I. L. ANDRONOV

Department of Astronomy, Odessa State University
Odessa 270014 USSR

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