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PERIOD AND LIGHT CURVE OF THE W UMA-TYPE STAR NSV 4070

NSV 4070 (= CSV 1297 = SVS 510), a star in the constellation of Cancer with coordinates 1950.0:  $\alpha = 8^{\text{h}}23^{\text{m}}24^{\text{s}}$   $\delta = +21^{\circ}02'.7$ , spectral type F0, is listed as a possible eclipsing binary in the New Catalogue of Suspected Variable Stars (Kukarkin et al., 1982).

It was proved to be a variable star by Kulikovski in 1934. Shakhovski (1955) confirmed the variability (photographic range: 11.5 to 12.4 mag) but not Kulikovski's period of 1.68 day. He suggested a shorter period and a possible W Uma type for the star. From 133 visual estimates made from 1983 February to April, yielding 6 times of minima, Figer (1983) came to the same conclusion.

To ascertain the period and obtain BV light curves we monitored NSV 4070 photoelectrically during 5 nights, from 1983 December 4 to 11, in alternance with FZ Orionis, another under-studied EW star (see Le Borgne et al., 1984). Both stars are part of the visual observing programme of the European group GEOS.

121 BV measurements of NSV 4070 were obtained at the 1 meter telescope of Pic du Midi Observatory using a photoelectric photometer and computerized data acquisition.

The measurements of several standard stars allowed the transformation to the Johnson and Morgan BV system every night; as a rule the achieved accuracy of the whole reduction procedure is about 0.03 mag.

The 0.418 day-period can be derived straightaway from the nightly curves of the variable. The mean V light curve in Figure 1 shows that most of the variation cycle was covered, a cloudy interval beginning at about 3 h U.T. on December 8 having unfortunately prevented us from observing what may have been a primary eclipse : as a consequence there still remains a doubt in the discrimination of both minima.

The magnitude at maximum is 11.73 in V band and 12.26 in B, the range of variation being near 0.7 magnitude in both colours. There seems to be a slight B-V variation throughout the cycle with a somewhat bluer secondary minimum (see Figure 1). If real, this effect could amount to 0.05 mag.

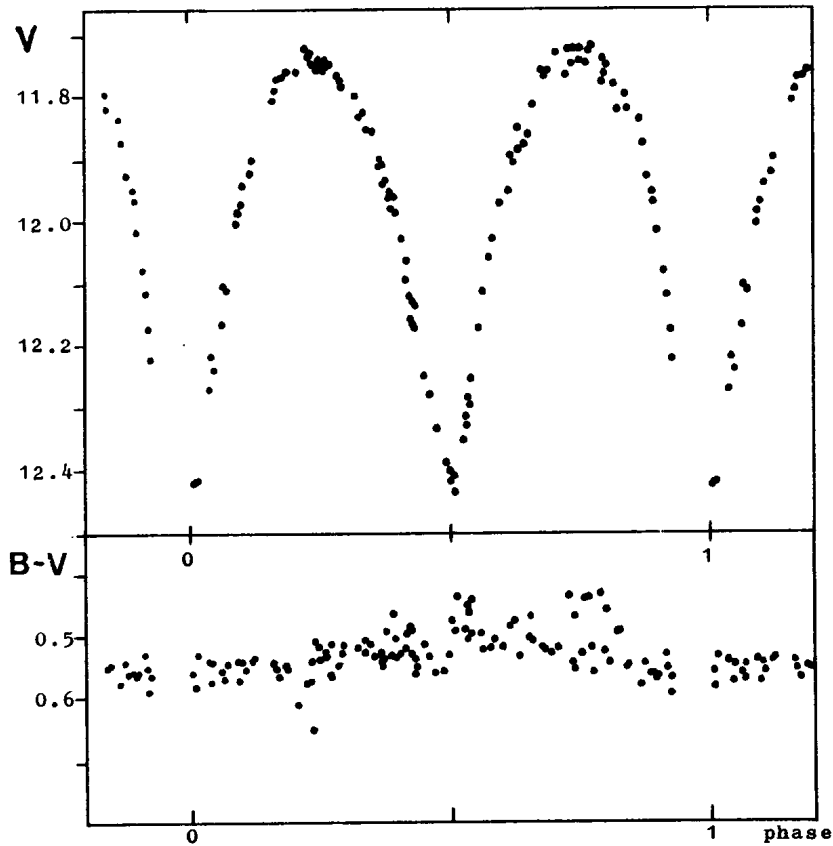


Figure 1: V and B-V light-curve of NSV 4070. Phase according to ephemeris (1).

A first ephemeris has been computed using 35 visual times of minimum obtained by several GEOS observers from 1983 to 1985 (Figer, 1985):

$$(1) \text{ Min I?} = \text{Hel.J.D. } 2\ 445\ 768.624 + 0.\overset{d}{4}18\ 034\ E \\ \qquad \qquad \qquad \quad \quad \quad \pm 0.003 \quad \pm 0.\ 000\ 004$$

Table I shows the photoelectric O-C's referring to this ephemeris. The agreement is fairly good.

Table I

Date	Filter	Hel.J.D.	O-C	Mag.	Type of minimum (tentative)
1983 Dec 4	V	2 445 672.6838	-0.0012	12.40	II
	B	.6827	-0.0023	12.94	II
1983 Dec 7	V	675.6123	+0.0011	12.43	II
	B	.6127	+0.0015	12.92	II
1983 Dec 8	V	676.6545 (*)	-0.0018	12.47??	I
	B	.6538 (*)	-0.0025	13.03??	I

(\*) using the partial descending branch observed on 1983 Dec 8 and the ascending one on 1983 Dec 11.

With its typical BV light curves, its 0.418-day period, its spectral type and quasi-constant B-V index, NSV 4070 can be definitely catalogued as a new W UMa-type variable.

The mean B-V index is equal to 0.53 mag. Considering that no correction for interstellar reddening was made, this value remains consistent with Eggen's period-colour relation for contact binaries (1961, 1967).

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