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PERIOD AND BV LIGHT CURVES OF A NEW W UMa VARIABLE GSC 4383.0384

The recent discovery of a new variable star GSC 4383.0384 by Kamil Hornoch, Jan Kyselý and Dalibor Hanžl has been announced in *IBVS*, No. 3879 (13 May 1993) [1].

The star was photometrically measured by means of the 0.4-m Nasmyth reflector of the N. Copernicus Observatory in Brno from 16th April to 25th May. The telescope was equipped with an unrefrigerated photomultiplier tube EMI 6256 with UBV filters of Johnson's standard system. An insufficient signal-to-noise ratio in the U band compelled us into using the reduced BV system only.

As the comparison star HD 86677 was adopted. The star is a very close visual double star (ADS 7611), the components of which are unresolvable by the instrument specified above. The basic BV data of the comparison star (V=7.876 mag, B−V=+0.510 mag), taken from *The Hipparcos Input Catalogue* [2], refer to the total light of this joint system. The light constancy of the star was confirmed by frequent observations of three check stars. (Basic data and BV photometry for the comparison and check stars will be published in [3]).

Observing the variable star GSC 4383.0384 in the course of 9 nights we obtained 244 and 239 individual photoelectric measurements in B and V, respectively (see Table 1).

Using the method of "trials and errors" we found a preliminary period of light variations: P=0.529 days. Both the corresponding BV light curves and the period rank the star among the W UMa type variables. The observed mean B−V index of +0.48 mag is also consistent with this classification. Then we improved the preliminary period applying a special gradient least square method [3] to the whole set of photometric data. We have arrived at the following formula predicting times of primary minima:

$$\begin{matrix} \mathrm{JD}_{hel} = 2\,449\,104.3592 + 0^{d}.528904\ (\mathrm{E}-19). \\ \pm 6 \qquad \pm 25 \end{matrix} \qquad (1)$$

As the reference minimum we have chosen the best observed primary minimum.

The period is obviously real, since all expected allied periods give much worse phase diagrams. The reality of the period given above has additionally been confirmed through independent visual observations of the star obtained by Kamil Hornoch [3], who did them without knowing any ephemeris.

The phase ϕ and the epoch E for an arbitrary JD_{hel} time can be evaluated through relations:

$$\mathrm{f}=(\mathrm{JD}-2\,449\,094.3100)/0.528904,\ \phi = \mathrm{Frac(f)},\ \mathrm{E}=\mathrm{Int(f)}. \qquad (2)$$

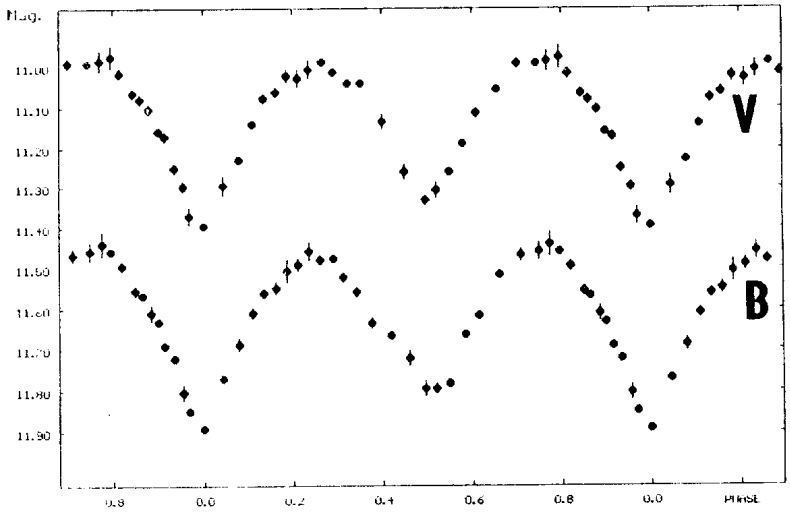

Figure 1

Table 1

night	1	2	3	4	5	6	7	8	9
JD-2449000									
begin.	94.33	95.32	98.31	101.32	102.51	104.31	121.34	125.34	133.37
end	.38	.36	.49	.51	.54	.54	.45	.50	.43
E + Φ									
begin.	0.03	1.90	7.57	13.26	15.50	18.91	51.10	58.66	73.85
end	0.12	1.98	7.90	13.61	15.57	19.35	51.31	58.98	73.96
B									
n_B	6	5	30	44	13	56	30	45	15
SD_B	.029	.037	.031	.063	.035	.027	.027	.020	.047
V									
n_V	6	5	30	38	13	56	30	45	16
SD_V	.038	.055	.031	.046	.046	.030	.033	.023	.056

Table 2

	B [mag]	V [mag]
Mean magnitude	11.614 ± 0.0035	11.132 ± 0.0025
Primary minimum	11.866 ± 0.011	11.382 ± 0.008
Secondary minimum	11.809 ± 0.012	11.328 ± 0.009
Maxima	11.455 ± 0.008	10.987 ± 0.006
Amplitude I	0.411 ± 0.014	0.395 ± 0.010
Amplitude II	0.354 ± 0.015	0.341 ± 0.011

Table 1 contains a review of our BV photoelectric observations. For individual nights they are listed here: JD_{hel} times of beginnings and ends of observations and corresponding values of sums $(E+\phi)$, and numbers of measurements n and standard deviations of one measurement in magnitudes (SD) in B and V colours, respectively.

The whole set of our BV photoelectric measurements embraces 74 cycles, both light curves are covered without gaps. Unfortunately, the accuracy of measurements is comparatively low (0.038 mag in B, 0.036 mag in V), which is due to both the faintness of the variable and generally bad observational conditions. That is why we have introduced normal points for the demonstration of lightcurves (see Figure). Each normal point of the light curve is a result of 7 individual consecutive dots of the phase diagram, the bar shows the expected error of the normal point.

The B band and V light curves exhibit two unequally deep light minima, the difference between their depths being (0.057±0.015) mag and (0.054±0.012) mag in B and V, respectively. The centre of the primary minimum has been put at the phase 0.000, the centre of the secondary seem to be placed at the phase 0.50. Both eclipses seems to be partial. The maxima, as we expected, occur near phases 0.25 and 0.75. The apparent unequality between them may be (at least in B) spurious. We have not found any pronounced variations of B−V so that it appears to be more or less constant within the whole cycle. The mean B−V is equal to (+0.482±0.004) mag. Absolute values of magnitudes of the variable GSC 4383.0384 are given in Table 2.

More detailed information on the star including the whole photometric and visual observational material and the description of the light elements determination method will be published in [3]. The variable appeals for further observations.

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[2] Turon, C. et al., 1992, *The Hippacros Input Catalogue*, INCA Consortium, ESA
[3] *Contribution of the Nicolas Copernicus Observatory and Planetarium in Brno*, No. 31, 1993 (will be published)