COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 5956

Konkoly Observatory
Budapest
9 December 2010

HU ISSN 0374 – 0676

PHOTOMETRIC STUDY OF A NOVA-LIKE CATACLYSMIC VARIABLE STAR NSV 25181

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Cyg1 ($\alpha = 20^{\rm h}34^{\rm m}14\overset{\rm s}{.}51$, $\delta = +50°48'06\overset{''}{.}2$; J2000.0) is mentioned in the Archival edition of the Catalog and Atlas of Cataclysmic Variables (Downes et al., 2006) as a cataclysmic variable without subtype specification. This information is based on the study by Downes (1986), who found out that spectra of Cyg1 were typical for cataclysmic binaries, the Balmer lines were in emission, their intensity was variable. Downes referred to a private communication by J. Patterson who observed the star flickering. Cyg1 resembles a dwarf nova in minimum light, although an examination of almost 300 plates from Harvard plate collection did not reveal any outburst of the star during the time interval from 1890 to 1962. The orbital period of the system is still unknown. The star was designated as NSV 25181 (Kazarovets et al., 1998).

To investigate the star more carefully, we have started our CCD photometry. NSV 25181 was observed at the 60-cm telescope of the Crimean Laboratory (Sternberg Astronomical Institute) equipped with an Apogee AP-47p CCD camera. Our observations cover eight nights on August 4–20, 2010 (JD 2455413–429). 1112 frames were taken with 120-second exposures in Johnson R filter. The images were debiased, dark-subtracted, flat-fielded and than analyzed in MaxIm DL4 package. USNO-A2.0 1350-12565617 ($\alpha = 20^{\rm h}34^{\rm m}10\overset{\rm s}{.}56$, $\delta = +50°47'27\overset{''}{.}0$; J2000.0; photographic R magnitudes: $15\overset{\rm m}{.}3$ in the USNO-A2.0 and $15\overset{\rm m}{.}03$ and $15\overset{\rm m}{.}17$ in the USNO-B1.0 catalog) was used for comparison. The accuracy of photometry is between $0\overset{\rm m}{.}01$ and $0\overset{\rm m}{.}07$ depending on weather conditions. The summary light curve is given in Fig. 1. The full amplitude of light variation is $0\overset{\rm m}{.}34$.

On the basis of our analysis, we consider NSV 25181 as a nova-like cataclysmic variable. Three kinds of variations were detected. Firstly, brightness slowly changes from night to night. Nightly average brightness varies within $0\overset{\rm m}{.}115$ for our interval of observations. Secondly, strong flickering takes place on time scale of minutes. Several individual night light curves are shown in Fig. 2. On some nights, the amplitude of variability reaches $0\overset{\rm m}{.}27$, mostly because of flickering. There is no evidence of the orbital variability in our photometry.

After whitening the light curve for night-to-night changes, we have analyzed our observational run for periodicity using the method by Deeming (1975). The third kind of variability of NSV 25181 was found. Most significant peaks in the power spectrum (Fig. 3) correspond to periods of 28.32 min (amplitude $0\overset{\rm m}{.}032$) and 24.58 min (amplitude $0\overset{\rm m}{.}026$).

The corresponding phased light curves are shown in Fig. 4. The nature of these oscillations remains unknown. One of possible reasons for them are non-radial pulsations of the white dwarf in the cataclysmic system (Arras et al., 2006; Gänsicke et al., 2006 and references therein). The double periodicity, values of the periods and their amplitudes are consistent with ZZ Cet type.

The periodic variability of NSV 25181 needs to be confirmed. We plan to continue our observations of this interesting variable.

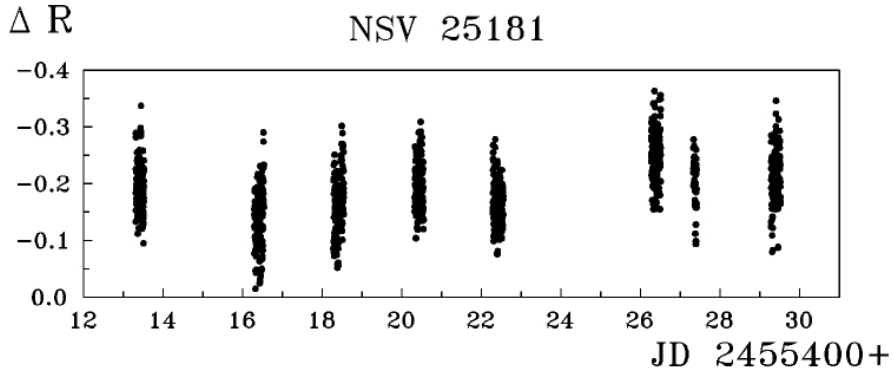

Figure 1. The summary light curve.

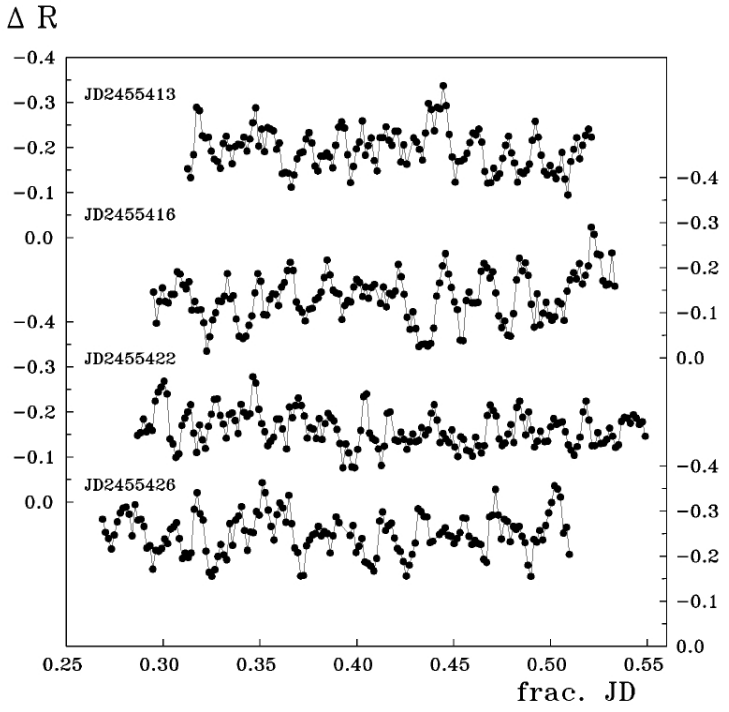

Figure 2. Individual light curves for four nights of observations.

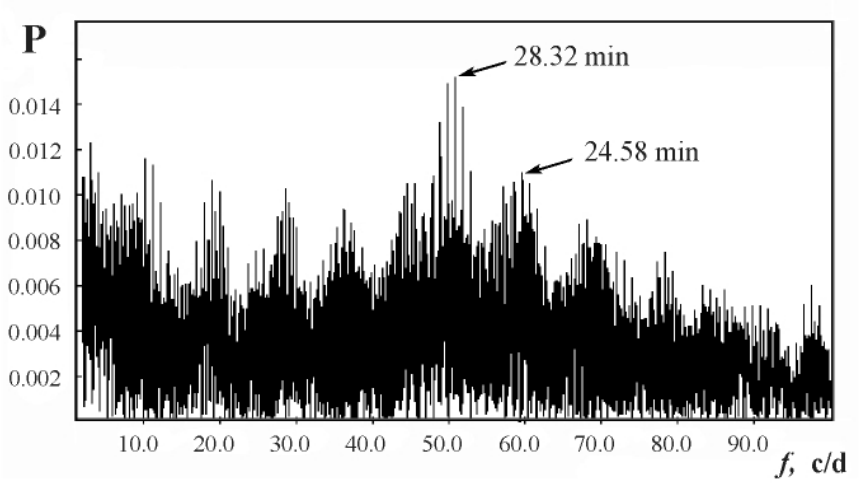

Figure 3. The power spectrum.

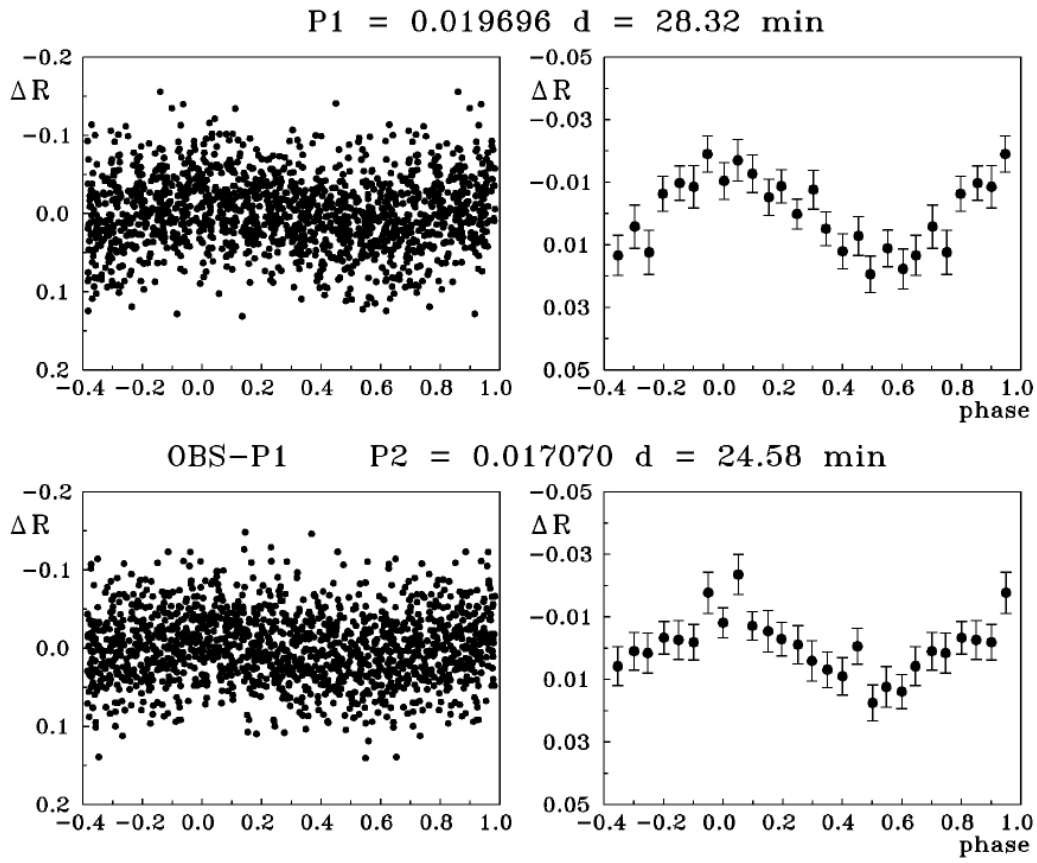

Figure 4. The phased light curves for two found periodicities. Bottom panels are constructed for the data whitened for the 28.32-minute variability.

Acknowledgements: We thank N.N. Samus for useful discussion. The study was supported in part by the Russian Foundation for Basic Research (grant No. 08-02-00375).

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