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CCD photometry of dwarf nova CI UMa during outburst in July 2006

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Abstract:
We present CCD photometry of the dwarf nova CI UMa obtained at Kolonica Observatory during its outburst in July 2006. We detected superhumps with period 0.06226±0.00012 days and amplitude about 0.3 mag in white light.

1. Introduction

CI UMa (SVS 1755) was discovered by Goranskij (1972), who reported atypical behaviour of the object between JD 2441390 and 2441410. The star was about m_{pg} = 17 around JD 2441390. In JD 2441394 variable reached maximum brightnes about m_{pg} = 13.8. After that decline of the rate 0.12 mag.d^{-1} was detected and star reached initial brightness m_{pg} = 17 in JD 2441411. Kolotovkina (1979) found many other outbursts of the star on photographic plates from archive at Sternberg Institute in Moscow. Bruch et al. (1987) detected another outburst in March 1981. The first spectrum of the CI UMa was obtained by Bruch (1989). Because of poor quality, no spectral lines was detected. Mukai et al. (1990) observed a spectrum with a strong broad emission of $H\alpha$ line. Howell et al. (1990) discovered photometric variations with period about 0.06041 days, when star was at quiescent state with m_V ~ 19. It was suggested that these variations are due to the orbital motion in binary. Nogami & Kato (1997) classified this system as SU UMa type dwarf nova and detected superhumps with period 0.0625 days.

2. Observations and Data Reduction

Our observations of CI UMa were obtained in three nights, July 19, 20 and 22, 2006 at Kolonica Observatory, which is located in north-east part of the Slovak Republic. Measurements were performed through 265/1360 mm Newton type telescope equiped by DSI Pro CCD camera with Sony's ExView HAD Monochrome CCD Image Sensor. The resolution of this camera is 508 x 489 pixels. The observations were obtained with no filter and were not transformed into the international system. We present only magnitude difference between CI UMa and comparison star. We used 30s integrations. The standard reduction of CCD

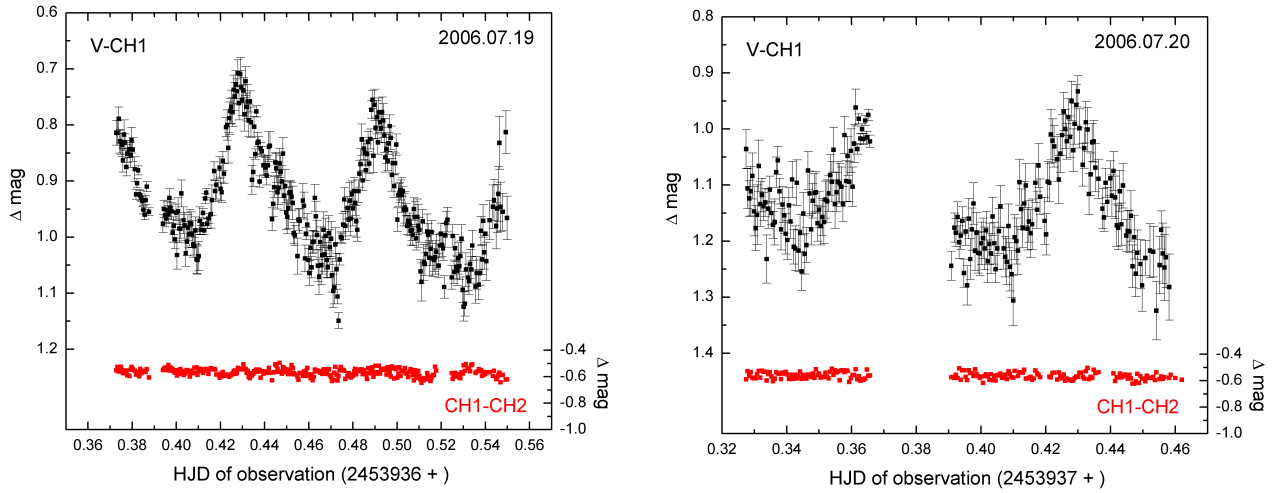

Figure 1: Differential light curves of CI UMa during July 19. (left) and July 20. (right) and variations of check stars.

frames (dark frame substraction, flat-fielding) and optimal aperture photometry were performed by software package SPHOTOM developed by the first author (for details see Parimucha, 2006). TYC 4387-855-1 (CH1) and TYC 4387-615-1 (CH2) were used as comparison and check stars respectively. These stars were found to be stable within 0.05 mag during all nights (see Figure 1).

3. Results and Conclusion

Our observations of dwarf nova CI UMa started just after alert about outburst from VSNET observers (vsnet-alert 8950). Our measurements cover totaly 8.1 hours. In Figure 1 we present differential light curves of the object during two nights (July 19 and 20). The light curves show superhumps with amplitude about 0.3 mag in white light. Observation from July 22 was too short to detect any superhumps, beacause of poor weather conditions. These data could be obtained in electronical form from authors, by request.

We used the observations from the first two nights to estimate superhumps periodicity. After removing linear decreasing trend, data were analysed by phase dispersion minimization (PDM) method (Stellingwerf, 1978). For period analysis we used 10 bins and 5 covers structure. The periodogram (Θ - statistics) is presented in Figure 2. The period 0.06226 ± 0.00012 days was found to be most significant. Its statistical significance was tested by means of randomization of the data (Linell Nemec & Nemec, 1985).

Table 1: Times of maxima od superhumps and its errors.

T_{max} [HJD]	error
2453936.45423	0.00017
2453936.47199	0.00009
2453937.45465	0.00008

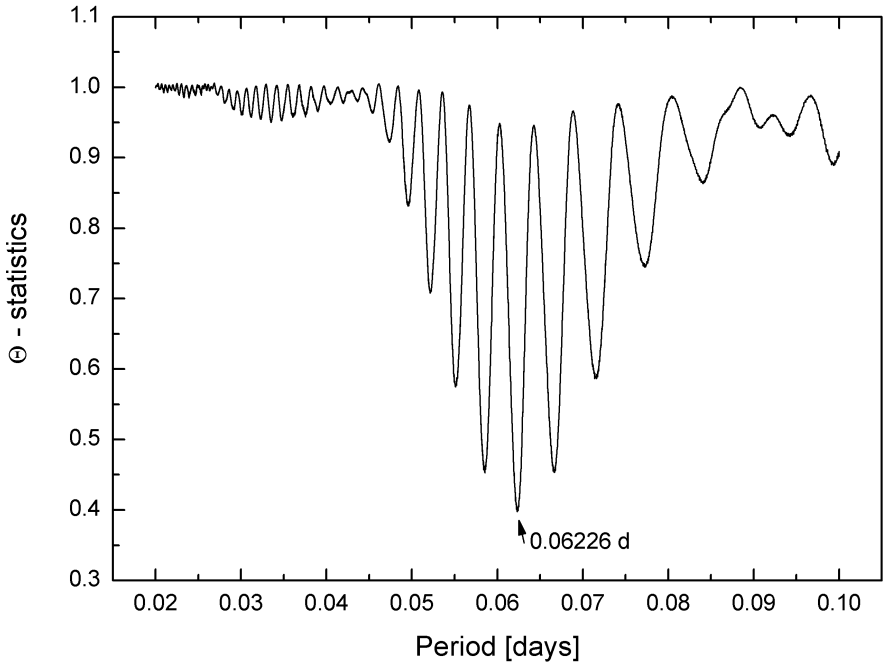

Figure 2 : Periodogram of light curve residuals of CI UMa.

In Table 1. we present times of superhumps maxima. They were determined by Kwee & van Woerden (1956) method. These times are useful for analysis of changes of superhumps periodicity.

Our superhump period is slightly smaller then period presented by Nogami & Kato (1997). It could mention to long term decrease of the superhump periodicity. More detailed analysis of CI UMa is in preparation and will be published afterwards.

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