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

Number 4763

Konkoly Observatory
Budapest
3 September 1999

HU ISSN 0374 – 0676

CCD PHOTOMETRY OF THE 1999 FEBRUARY SUPEROUTBURST OF CY UMa

T. KATO, K. MATSUMOTO

Dept. of Astronomy, Kyoto University, Kyoto 606-8502, Japan, e-mail: tkato@kusastro.kyoto-u.ac.jp

CY UMa was discovered as a dwarf nova by Goranskij (1977). Following the initial claim of visual and photographic superhump detection by Kato et al. (1988), CCD observations independently revealed the presence of superhumps (Kato 1995; Harvey, Patterson 1995).

During the 1999 February superoutburst, starting on 1999 February 10 (E. Muyllaert, $m_{\rm v} = 12.5$, VSNET), we undertook time-resolved CCD photometry of CY UMa.

The observations were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt-Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the Java$^{\rm TM}$-based aperture and PSF photometry package developed by one of the authors (TK). The flux of the variable was measured relative to GSC 3446.96 (Tycho $V = 10.84$, $B - V = 0.38$; USNO r-magnitude 10.1), whose constancy was confirmed by comparison with GSC 3446.384 (USNO r-magnitude 12.4).

Figure 1 illustrates the overall light curve of the present observation. Before February 22 (JD 2451232) individual observations are plotted; after the decline, nightly averages with error bars are plotted instead. The superoutburst plateau stage (February 13–20) was analyzed, after subtracting the linear decline trend (0.14 mag d^{-1}), using the Phase Dispersion Minimization (PDM) method (Stellingwerf 1978).

The result of period analysis is given in Figure 2. Although unavoidable one-day aliases exist, we can safely choose, with the help of previous period determinations, the correct period of 0.0722 ± 0.0001 d, corresponding to the frequency of 13.85 d^{-1}. The present best period agrees with previous reports within respective errors: 0.0719 ± 0.0005 d (Kato 1995) and 0.07210 ± 0.00003 d (Harvey, Patterson 1995).

Besides superhumps, we examined the post-superoutburst behavior, during which some SU UMa-type dwarf novae are known to show rebrightenings. No evidence of rebrightening was observed, both in our CCD monitoring until 12 d past the steep decline, and visual monitoring reported to VSNET.

Figure 3 shows enlarged light curves of nightly runs. The typical error of a single measurement was 0.01 mag on February 13 and 0.02 mag on other nights. The amplitude of superhumps was the largest (0.30 mag) on February 13, and gradually decayed. On the declining branch from the superhump maximum on February 13, quasi-periodic oscillations (QPOs) with a period of 10–15 m were visible. This modulation quickly decayed on subsequent nights.

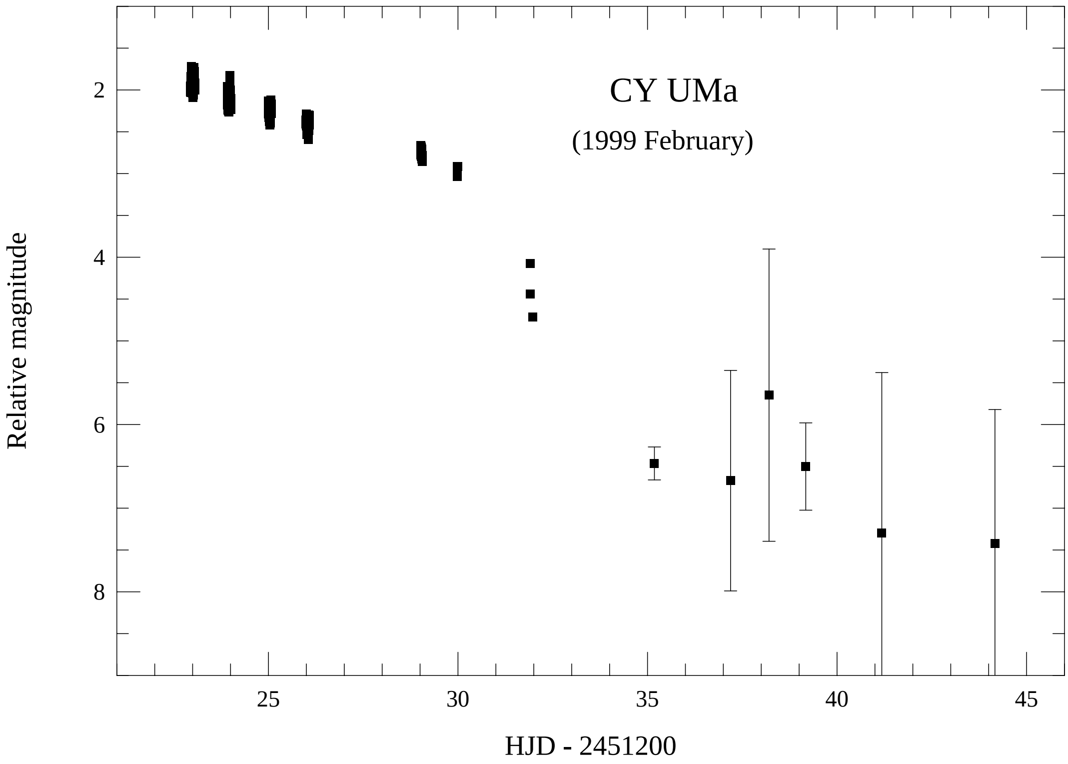

Figure 1. Overall light curve of CY UMa

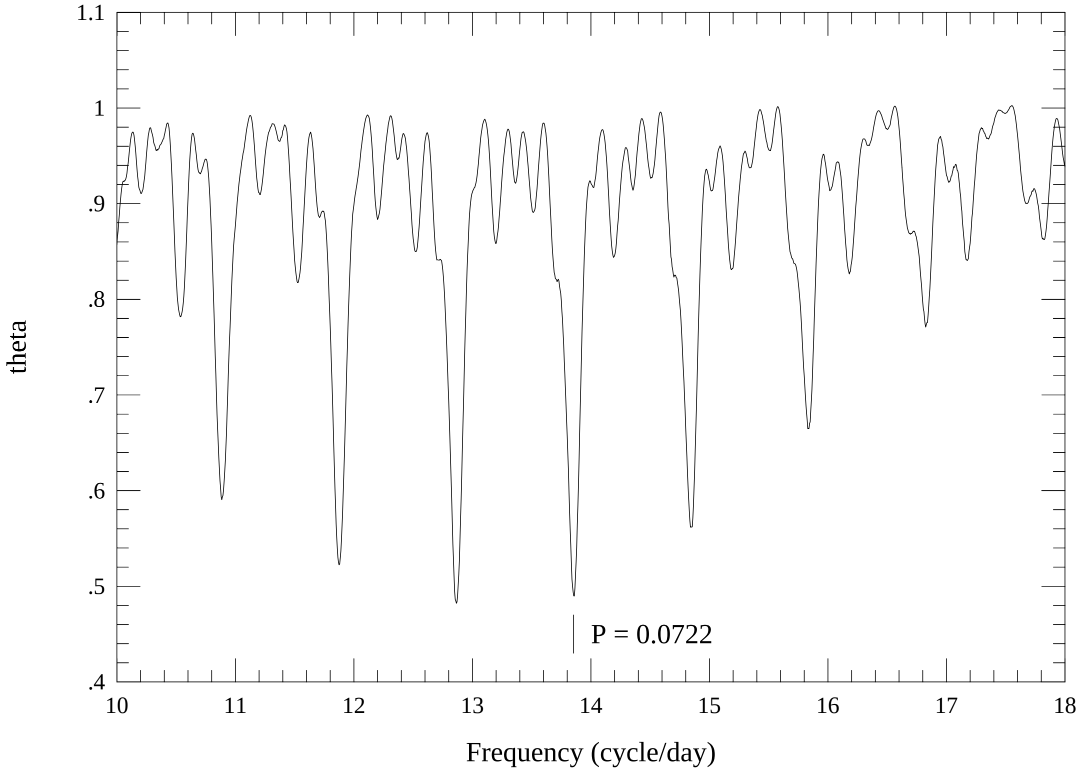

Figure 2. Period analysis of CY UMa

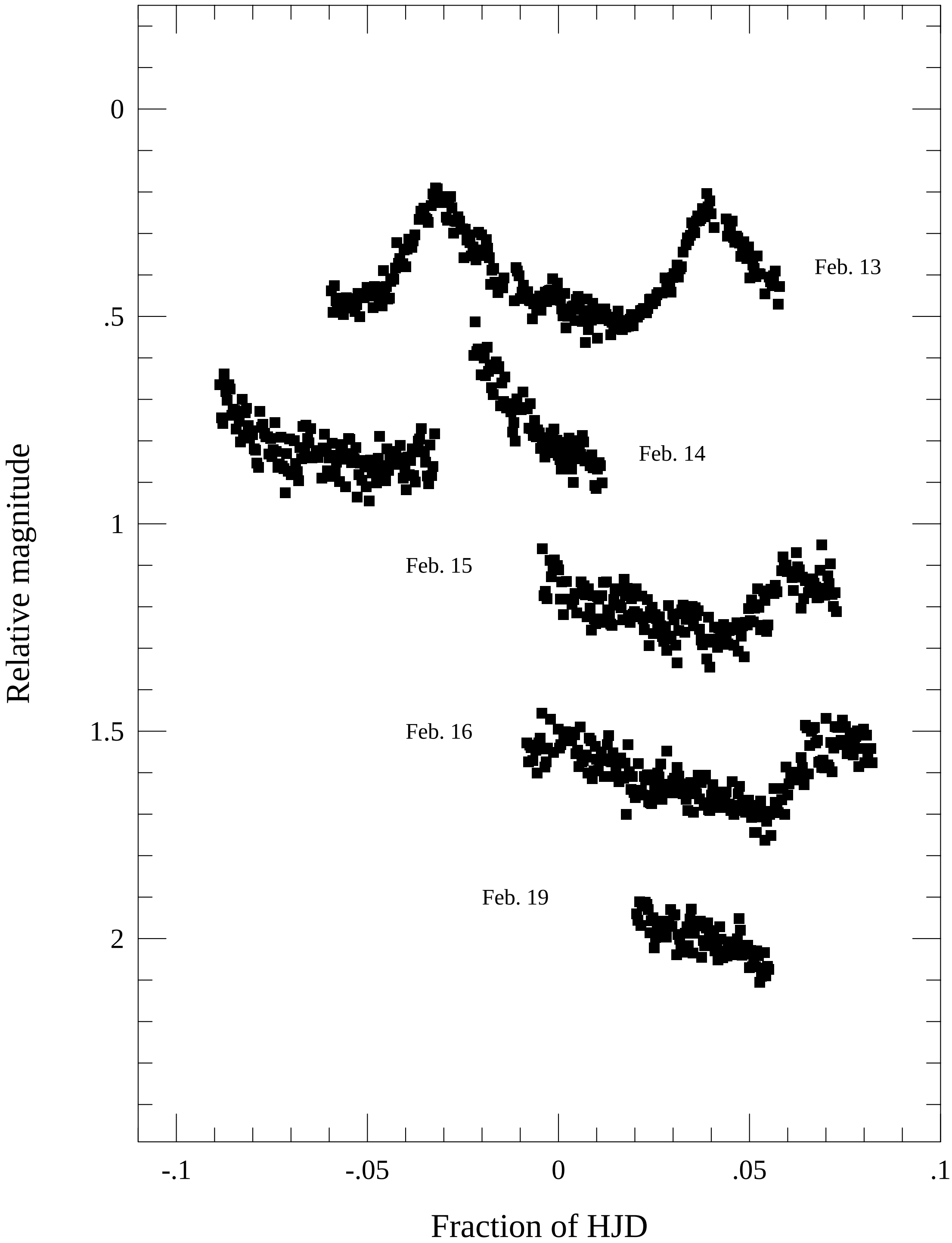

Figure 3. Nightly light curve of CY UMa

The authors are grateful to VSNET observers who reported timely visual observations. This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture, and Sports (TK). Part of this work is supported by a Research Fellowship of the Japan Society for the Promotion of Science for Young Scientists (KM).

References:

Goranskij, V. P., 1977, *Astron. Tsirk.*, No. 942
Harvey D., Patterson J., 1995, *PASP*, **107**, 1055
Kato T., 1995, *IBVS*, No. 4236
Kato T., Fujino S., Iida M., Makiguchi N., Koshiro M., 1988, *VSOLJ Variable Star Bulletin*, **5**, 18
Stellingwerf, R. F., 1978, *ApJ*, **224**, 953