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CCD PHOTOMETRY OF THE 1999 MARCH OUTBURST OF BZ UMa: DETECTION OF QUASI-PERIODIC OSCILLATIONS

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BZ UMa is a dwarf nova whose orbital period has been determined as $0^{\rm d}.0679$ (Ringwald et al. 1994; Jurcevic et al. 1994). Although the orbital period shorter than the period gap strongly suggests the SU UMa-type classification, no confirmed superoutburst has been yet observed (Jurcevic et al. 1994).

Upon the alert of a bright outburst on 1999 March 9, reaching $m_{\rm v} = 10.4$ (Muyllaert 1999), we started time-resolved CCD photometry. The outburst rivaled the brightest recorded historical outbursts (cf. Jurcevic et al. 1994).

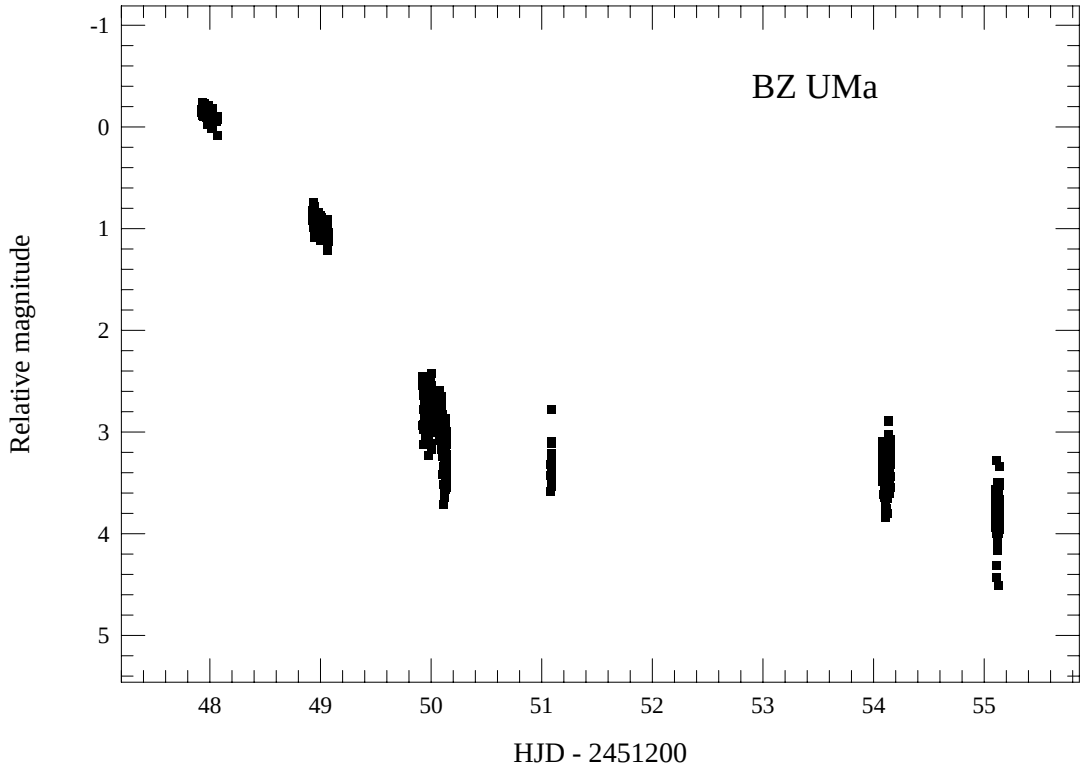

Figure 1. Overall light curve of BZ UMa

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™-based PSF photometry package developed by the author. The differential magnitudes of the variable were measured against GSC 3811.976 (USNO *r*-magnitude 11.3), whose constancy was confirmed by comparison with GSC 3811.1354 (USNO *r*-magnitude 11.9).

The overall light curve is shown in Figure 1. The magnitudes are given relative to GSC 3811.976. The outburst was, despite its brightness, a short, rapidly fading one. No detectable superhumps were observed. However, on its decline, the object showed unusual short time-scale oscillations. Figure 2 shows the best exemplification of the wave (the first fragment of the 1999 March 12 run).

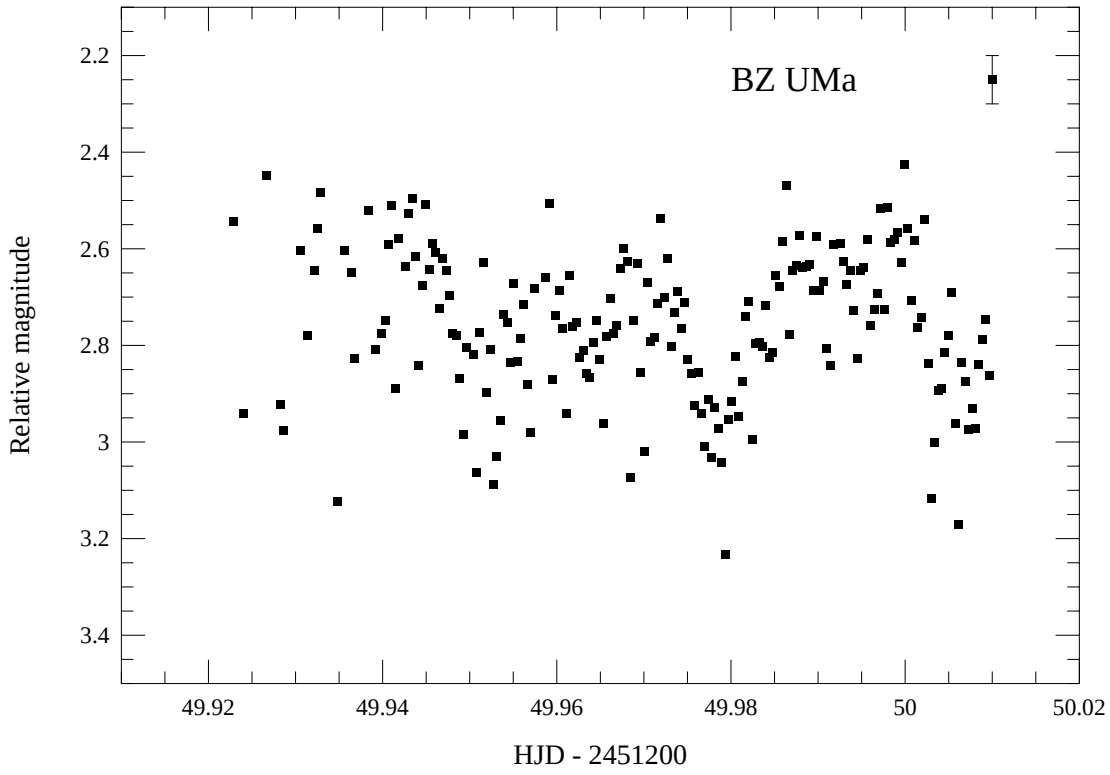

Figure 2. Enlarged light curve on March 12

The period of modulations was close to $0^{d}.03$; the amplitude of the signal was as large as $0^{m}.3$, the profile was double-waved to this period. Figure 3 shows the result of the period analysis by applying the Phase Dispersion Minimization (PDM) method (Stellingwerf 1978) to the March 12 data, after removing the long-term trend. The best period was $0^{d}.0271$, but as is evident from the broad signal in the theta diagram, the modulations were quasi-periodic in nature. Superposition of different periodicities is also possible. The significant deviation from the orbital period may suggest that the modulation can be caused by the intermediate polar, or QPO-like phenomenon. The relative strength of high-excitation lines (Ringwald et al. 1994; Jurcevic et al. 1994), and the relatively strong X-ray emission (= 1RXS J085343.5+574846) may also support a weakly magnetic white dwarf. If the intermediate polar nature of BZ UMa can be confirmed by future observations, it may be a clue to understanding the apparent lack of superoutbursts.

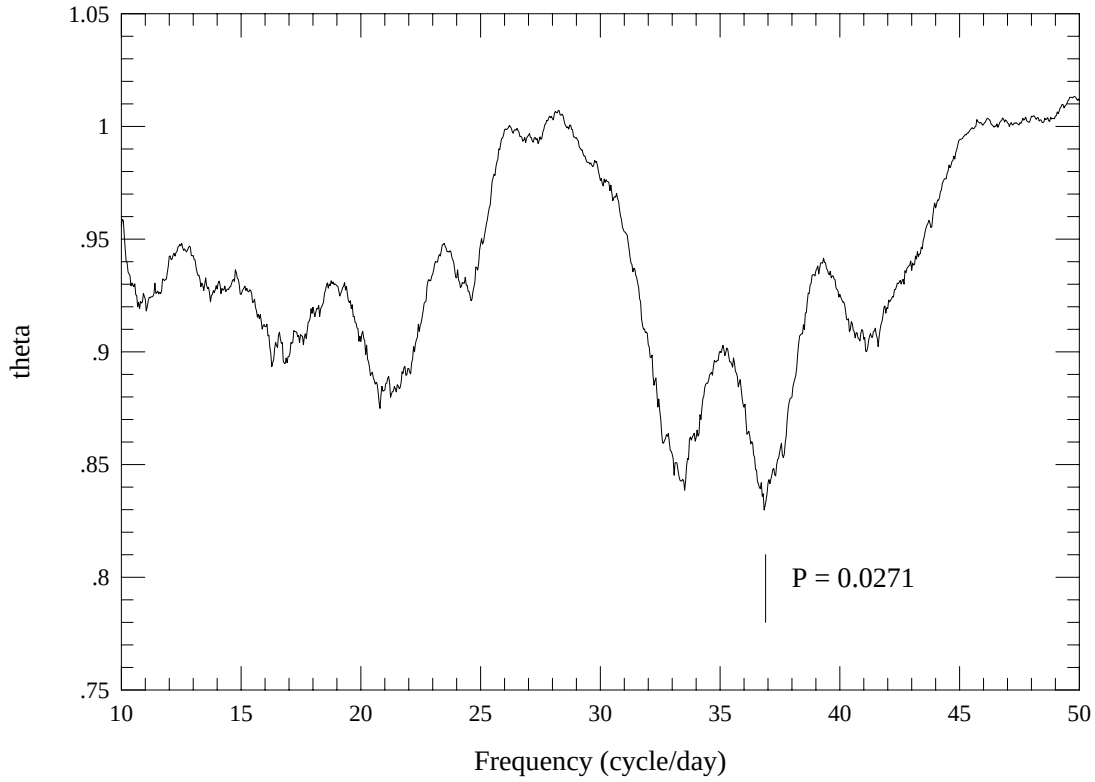

Figure 3. Periodogram of BZ UMa

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