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OBSERVATION OF SUPERHUMPS IN IR Gem

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IR Gem is a well-known SU UMa-type dwarf nova. However, little observation of superhumps has been reported since the identification as an SU UMa-type dwarf nova (Szkody et al. 1984). We observed this star during its 1991 March superoutburst.

The observations were done on two successive nights, 1991 March 18 and 19, using a CCD camera (Thomson TH 7882, 576 × 384 pixels, on-chip 3 × 3 binning adopted) attached to the Cassegrain focus of the 60-cm reflector (focal length = 4.8 m) at Ouda Station, Kyoto University (Ohtani et al. 1992). An interference filter was used which had been designed to reproduce the I_c band. The exposure time was 10 s. The frames were first corrected for standard de-biasing and flat fielding, and were then processed by a microcomputer-based aperture photometry package developed by the author. The magnitudes of the object were determined relative to GSC 1905.753 (GSC magnitude 11.07), whose constancy during the run was confirmed using the check star USNO A1.0-1125.04589035. Barycentric corrections to observed times were applied before the following analysis. Table 1 lists the log of observations, together with nightly averaged magnitudes.

Figure 1 shows the resultant light curve. Superhumps are prominently seen. After removing the trend of decline, we applied Phase Dispersion Minimization (PDM) method (Stellingwerf 1978). The resultant theta diagram is shown in Figure 2. The result generally confirms the superhump period of $0^{\rm d}.07076$ reported by Szkody et al. (1984). The best period determined from our data is 0.07094 ± 0.00006 d, which is slightly longer than that by Szkody et al. (1984). By taking the orbital period of $0^{\rm d}.0684$ (Feinswog et al. 1988), the fractional superhump excess is 3.7%. The most remarkable difference of superhumps from those observed by Szkody et al. (1984) is the clear presence of secondary superhumps, i.e. bump-like feature on the fading branch of superhumps. The feature was markedly seen on 1991 Mar 18, but became less clear on the subsequent night. This feature was discussed by Udalski (1990) on SU UMa itself. Udalski (1990) proposed that this feature may arise from a cooler component of the disk, but the nature is not still well understood. The appearance of secondary superhumps in I_c band light curve may be consistent with Udalski's (1990) hypothesis.

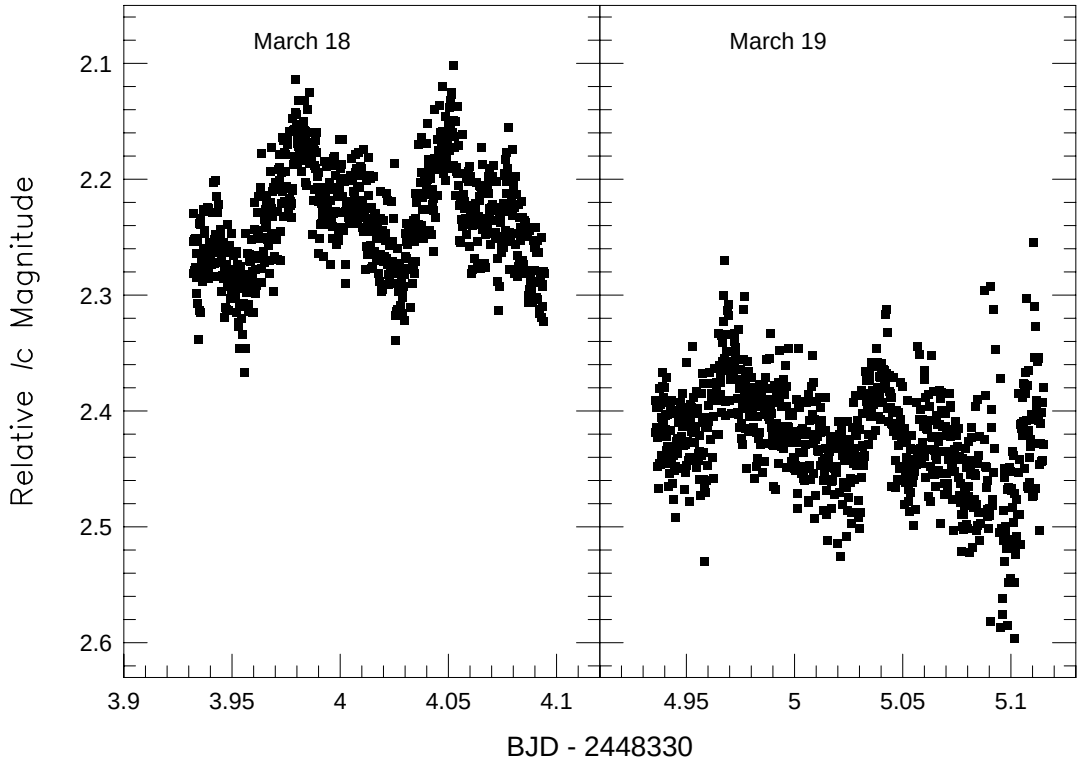

Figure 1. Light curve of the 1991 March superoutburst of IR Gem

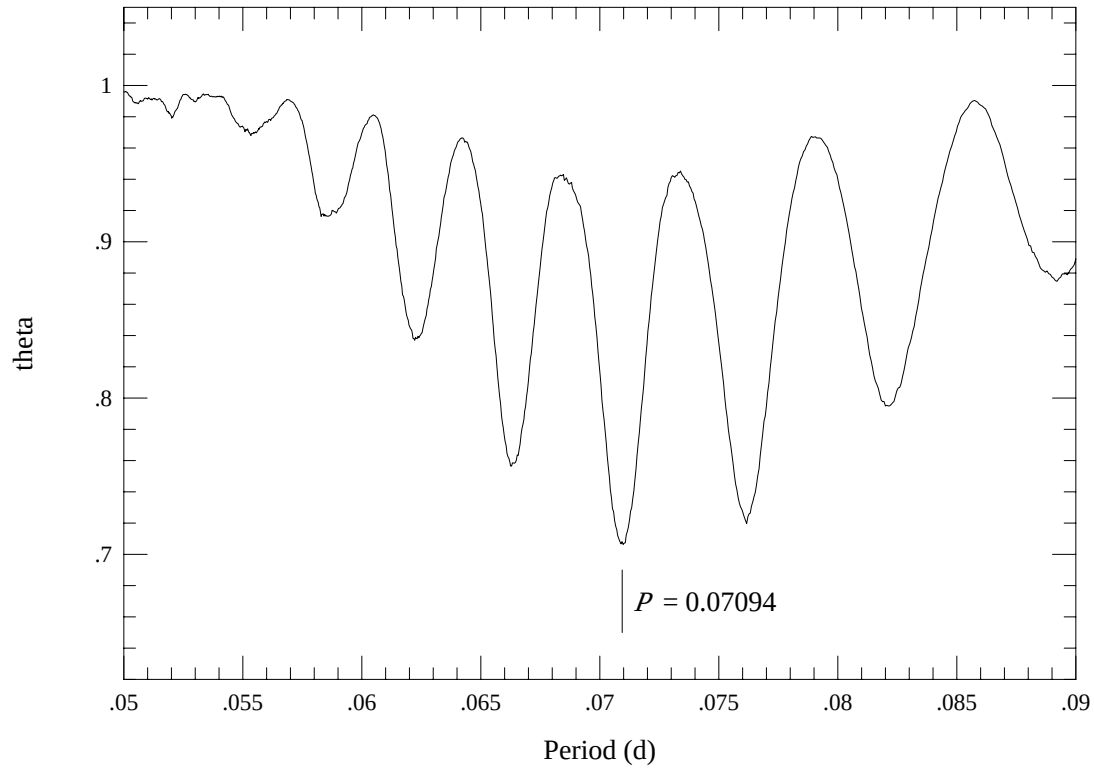

Figure 2. Periodogram of IR Gem

Table 1: Log of observations

start[a]	end[a]	mean mag[b]	error[c]	N[d]
48333.932	48334.084	2.234	0.002	760
48334.936	48335.115	2.420	0.002	816

[a] BJD − 2400000
[b] Magnitude relative to GSC 1905.753
[c] Standard error of nightly average
[d] Number of frames

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