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OUTBURSTS OF CG Dra

KATO, TAICHI[1]; NOGAMI, DAISAKU[2,1]

[1] Dept. of Astronomy, Kyoto University, Kyoto 606-8502, Japan, e-mail: tkato@kusastro.kyoto-u.ac.jp
[2] Hida Observatory, Kyoto University, Gifu 506-1314, Japan, e-mail: nogami@kwasan.kyoto-u.ac.jp

CG Dra is a faint dwarf nova discovered by Hoffmeister (1966). He reported frequent occurrence of outbursts and a small outburst amplitude. Bruch et al. (1987) observed this object on eight nights and found one outburst. Cannon Smith et al. (1997) obtained spectra and detected the feature of a K-type secondary. Bruch et al. (1997) found spectral type of K5 $\pm$ 2 for the secondary. Bruch et al. (1997) also detected variations in the observed radial velocities of Balmer emission lines. From these variations, they suggested a possible orbital period of $0^{\rm d}.1893$ or $0^{\rm d}.2343$. However, they argued that the spectral type of K5 $\pm$ 2 corresponds to a longer orbital period of $\sim 0^{\rm d}.27$. Bruch et al. (1997) also found inconsistencies between the radial velocities of emission lines and the absorption features, which they attributed to the secondary. These inconsistencies suggest that either the canonical model is wrong, or the object is a peculiar system.

The observations were done on six nights between 1996 May 6 and July 29, using a CCD camera (Thomson TH 7882, 576×384 pixels, on-chip 2×2 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 Johnson V band. The exposure time was 60–120 s depending on the brightness of the object. The frames were first corrected for standard de-biasing and flat fielding, and were then processed by a microcomputer-based PSF photometry package developed by one of the authors (TK). The magnitudes were determined relative to GSC 3920.1216 (GSC magnitude 13.12), whose constancy during the run was confirmed using the check star GSC 3920.954 (GSC magnitude 14.67). Table 1 lists the log of observations, together with nightly averaged magnitudes. The overall light curve is shown in Figure 1.

Two outbursts were observed, both on their fading stages. The high frequency of outbursts is also inferred from this observation. The outburst cycle length is shorter than 82 d. Both outbursts faded very slowly. The first outburst showed a linear decline at a rate of 0.14 mag d^{-1}. The second outburst showed a slightly varying decline rate, and its nominal average was 0.31 mag d^{-1}. Although the data points are few to accurately determine the typical decline rate of this object, the values on the both occasions are remarkably smaller than decline rates in other dwarf novae (cf. Warner 1995). This is consistent with the spectroscopic evidence that CG Dra shows a large contribution from the secondary, suggesting a long orbital period. Since DX And (Kato and Nogami 2001), having an orbital period of $0^{\rm d}.4405$, showed a rate of decline of 0.35 mag d^{-1}, Bailey's relation (cf. Szkody and Mattei 1984; Warner 1995) suggests an even longer period for

Table 1: Nightly averaged magnitudes of CG Dra

mid-JD[a]	mean mag[b]	error[c]	N[d]	mid-JD	mean mag	error	N
50210.181	2.532	0.059	5	50292.042	3.064	0.087	4
50213.266	2.917	0.059	3	50293.130	3.538	0.058	5
50218.291	3.634	0.140	3	50294.125	3.699	0.111	5

[a] JD − 2400000 [b] Magnitude relative to GSC 3920.1216
[c] Standard error of nightly average [d] Number of frames

CG Dra. From the photometric point of view, we support the longer orbital period inferred from the spectroscopic classification of the secondary. The apparent periodicity in the radial velocity variation, as already argued by Bruch et al. (1997), seems to more reflect something other than the orbital motion itself.

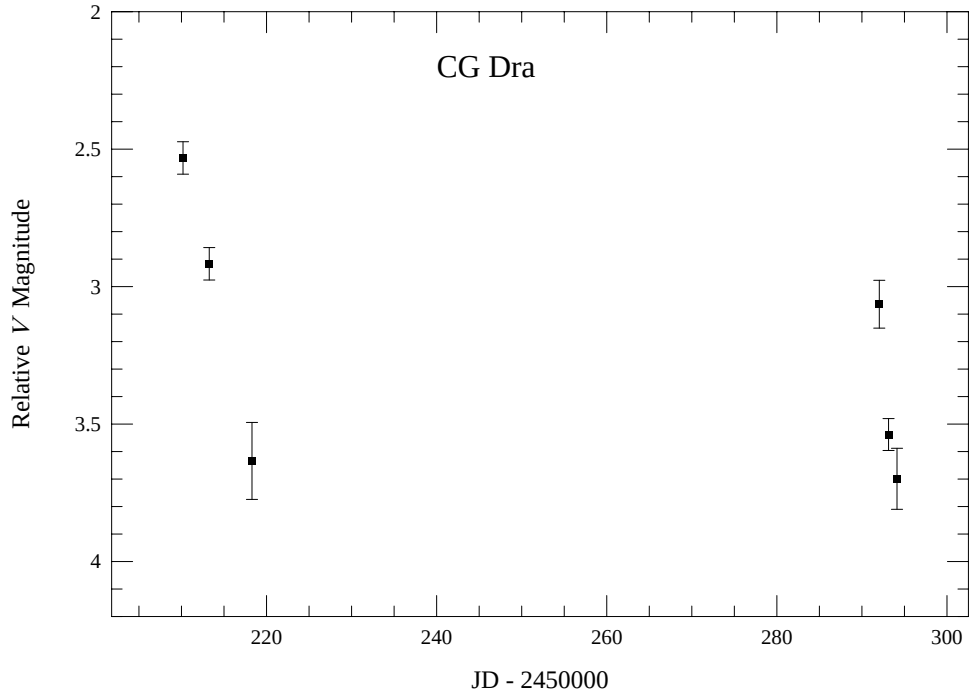

Figure 1. Overall light curve of CG Dra

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