

## **The 2003-2004 Superoutburst of SDSS J013701.06-091234.9**

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**Abstract.** We report on time-resolved photometry of the superoutburst of a new SU UMa-type star, SDSS J013701.06-091234.9 in 2003 December-2004 January. The obtained lightcurves show superhumps with a period of 81.7 min, which is one of the shortest periods among known SU UMa-type stars. The fractional superhump excess is 0.025, slightly larger than that of TOADs. Spectroscopic observations provided evidence for TiO band, implying a peculiar nature of the system when taking into account the fact that there is almost no evidence for a secondary star among SU UMa stars with short orbital periods. We also derived a distance to J0137 to be about 300 pc.

SDSS J013701.06-091234.9 (hereafter J0137) was pointed out by Szkody et al.(2003) as a cataclysmic variable, based on the optical spectrum. Quiescent photometric studies were performed by Pretorius et al.(2004) who derived the orbital period and the quiescent magnitude of J0137 to be 79.7 min and 18.6 mag in V, respectively. The quiescent lightcurves exhibit double-humped modulations with an amplitude of 0.2 mag. Similar modulations are often shown near the maximum of WZ Sge stars (Patterson et al. 2002; Ishioka et al. 2002). During the observations, Pretorius et al. (2004) faced a brightening of J0137 up to V=12.5 mag on Dec. 21, 2003, at which the lightcurves did show superhumps with a modulation of 0.3 mag, qualified J0137 as a new SU UMa star. This is the first recorded brightening including a normal outburst.

Outburst observations were also performed by the VSNET Collaboration Team (Kato et al. 2004) from Dec.23, 2003 to Jan.15 2004 at 10 sites. Extensive data points exceeding 5000 were obtained. Figure 1 shows superoutburst lightcurves in which a rebrightening feature is prominent around HJD 2453018. The plateau stage lasted for 16 days, which is slightly longer than that of typical SU UMa stars. The outburst amplitude exceeded 6 mag, which qualified J0137 as an extreme subclass of SU UMa stars, TOADs (Howell et al. 1995). We also obtained the mean superhump period and the fractional superhump excess are 81.7 min and 0.025, respectively. A possible distance to J0137 is about 300 pc, although there includes an uncertainty.

The most significant fact about J0137 is the detection of TiO band in an optical spectrum, which is undisputed evidence for a secondary star despite the fact that the orbital period of J0137 is 79.7 min. As is well known, in such a short period system, there is no evidence for a secondary star. An exception is EI Psc (Uemura et al. 2002) which is a promising progenitor for AM CVn stars. In addition, the fractional superhump excess of J0137 is 0.025, which is slightly larger than that of TOADs, WX Cet and SW UMa. In conjunction with these

facts, we propose that J0137 shares a similar mechanism with EI Psc. More and more observations make it possible to discover an object which shows more superhump excess than that of J0137. Such an object will satisfy a missing link between SU UMa stars and EI Psc stars.

More discussions will be given in Imada et al. (in prep.).

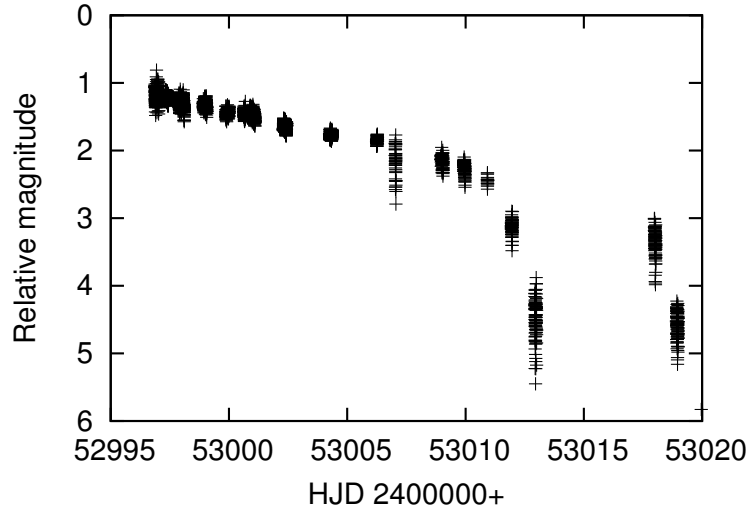


Figure 1. Lightcurves of the 2003-2004 superoutburst of J0137. The ordinate 1 corresponds to 12.5 mag. Some data points have a large error due to bad weather. Superhump features are evident during the plateau stage. A rebrightening was observed on HJD 2453015.

## References

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