

Superoutburst of CR Bootis: Estimation of mass ratio of a typical AMCVn star by stage A superhumps

Isogai K., Kato T., Ohshima T., Kasai K., Oksanen A., Masumoto K., Fukushima D., Maeda K., Kawabata M., Matsuda R., Kojiguchi N., Sugiura Y., Takeda N., Matsumoto K., Itoh H., Pavlenko E., Antonyuk K., Antonyuk O., Pit N., Sosnovskij A., Baklanov A., Babina J., Sklyanov A., Kiyota S., Hamsch F., Littlefield C., Maeda Y., Cook L., Masi G., Dubovsky P., Novák R., Dvorak S., Imada A., Nogami D.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The Author 2016. We report on two superoutbursts of the AMCVn-type object CR Boo in 2014 April-March and 2015 May-June. A precursor outburst accompanied both of these superoutbursts. During the rising branch of the main superoutburst in 2014, we detected growing superhumps (stage A superhumps) whose period was 0.017669(24) d. Assuming that this period reflects the dynamical precession rate at the radius of the 3:1 resonance, we could estimate the mass ratio ($q = M_2/M_1$) of 0.101(4) by using the stage A superhump period and the orbital period of 0.0170290(6) d. This mass ratio is consistent with that expected from the theoretical evolutionary model of AMCVn-type objects. The detection of precursor outbursts and stage A superhumps is the second case in AMCVn-type objects. There are two interpretations of the outbursts of AMCVn-type objects. One is a dwarf nova (DN) outbursts analogy, which suggests that the outbursts are caused by thermal and tidal instabilities. Another is the VY Scl-type variation, which suggests that the outbursts are caused by the variation of the mass-transfer rate of the secondary. This detection of the superhump variations strongly supports the former interpretation.

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Keywords

Accretion, Accretion disks-novae, Cataclysmic variables-stars, Dwarf novae-stars, Individual (CR Bootis)