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STABILITY OF PULSATION OF V577 OPHIUCHI

ZHOU, AI-YING

National Astronomical Observatories, Chinese Academy of Sciences, Beijing, P.R. China
e-mail: aiying@bao.ac.cn

V577 Ophiuchi (11.01 V, A8) is an eclipsing binary with a non-circular orbit (eccentricity $e = 0.22 \pm 0.08$) and a δ Sct-type primary component (Diethelm 1993). Previous observations clearly show the intrinsic pulsational variation superimposed on the eclipse light curve. The pulsation just disappears in the primary minimum and has almost double amplitude in the secondary one (Volkov 1990). In order to detect the multiperiodicity of the pulsation of V577 Oph, we observed the star in 2000. The data were collected with a red-sensitive Thomson TH7882 576×384 CCD photometer (Wei et al. 1990; Zhou et al. 2001) on the 85-cm Cassegrain telescope at the Xinglong Station of the Beijing Astronomical Observatory of China. The CCD has an imaging size of 13.25×8.83 mm^2 corresponding to a sky field of $12\farcm3 \times 8\farcm4$ ($1\farcs2$/pixel, a pixel size is 23 μm^2). Two stars in the field of V577 Oph were selected as references. They are

C1 = GSC 00444_01191 ($RA = 18^{\rm h}16^{\rm m}46\fs55$, $DEC = 06^\circ57'08\farcs2$, 2000.0, 12.6 V),
C2 = GSC 00444_02025 ($RA = 18^{\rm h}17^{\rm m}02\fs51$, $DEC = 06^\circ54'37\farcs6$, 2000.0, 11.5 V).

Exposure times were 30 s. A Johnson V filter was used. Atmospheric extinction was not taken into account in view of the close spacing of the observed stars. The differential colour effect between the variable and the reference stars are largely eliminated by taking the mean combination of the latter. Hence the differential magnitudes of V577 Oph are calculated relative to the two comparison stars as V $-$ (C1 + C2)/2. The magnitude differences between the comparison stars generally show a typical standard deviation of $0\fm010$. For the nights of good seeing a better value of about $0\fm006$ was obtained. These two comparison stars were detected to be non-variables at the accuracy of observation.

A preliminary Fourier analysis based on the data from four nights (11, 12, 21 and 30 June 2000) demonstrates that the light variations of V577 Oph can be well fitted with a single pulsation frequency $f = 14.3903$ cycle d^{-1} ($P = 0.069491$ d) having a semi-amplitude of $0\fm0289$. The fitting yields the residuals with a standard deviation of $\sigma = 0\fm0162$. We tried fitting the light curves with two more frequencies. When an additional second term at 16.2738 cycle d^{-1} was considered, the σ or the quality of fitting was not significantly improved. We recalled that all the observations collected in 1987–1990 by Volkov (1990) revealed the stability of pulsation in 2.5 year interval period. The period given in the ephemeris $\mathrm{HJD_{max}} = 2447620.379 + 0.0694909 \times E$ (Volkov 1990) is in close agreement with the present value. Therefore, we think that the pulsation frequency of V577 Oph has been quite stable since 1987. The question of amplitude variability is still open. Figure 1 displays the observed (dots) and fitted (lines) light curves of the star from the four nights.

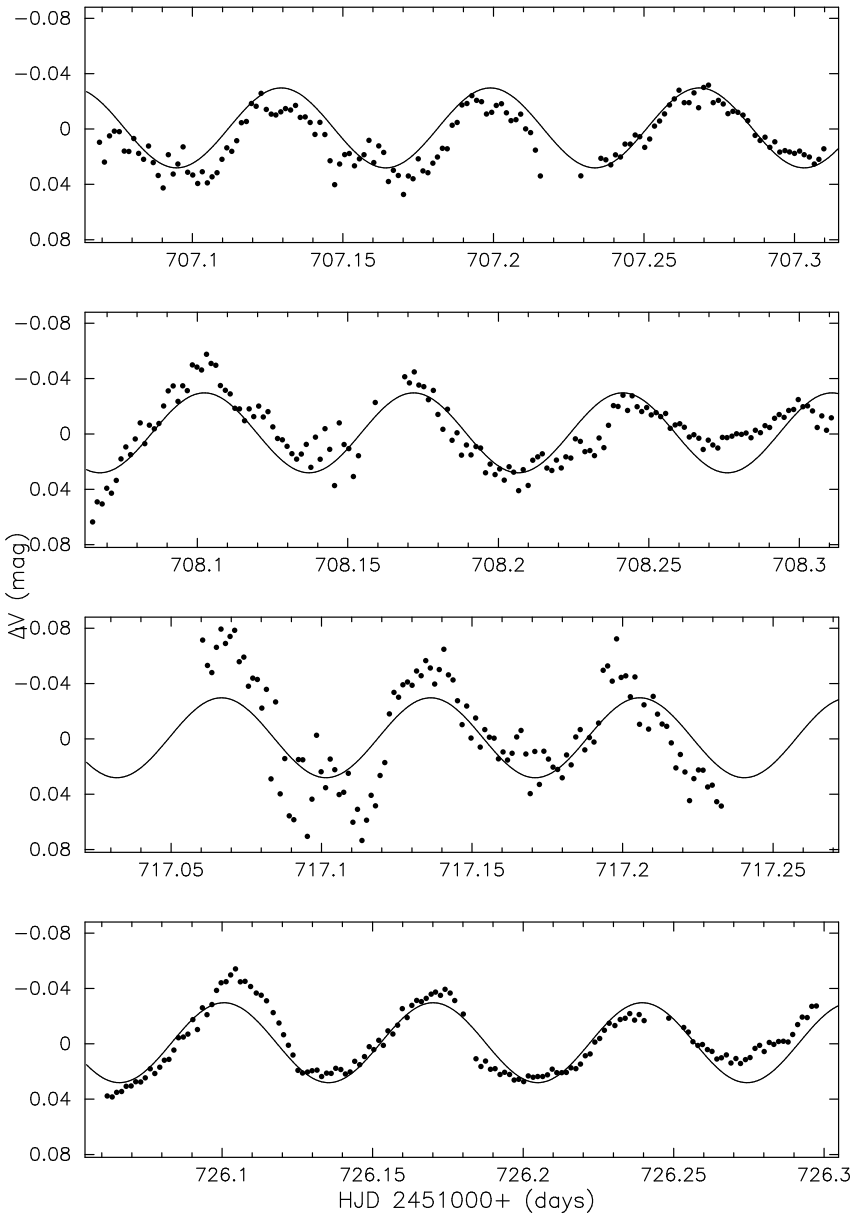

Figure 1. CCD differential light curves of V577 Oph from four nights in June 2000

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