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**DISCOVERY OF SHORT-PERIOD OSCILLATIONS
IN THE MASS-ACCRETING COMPONENT OF BD Vir**

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The “**Thai Sky Survey for oEA Stars**” (THASSOS) project is focused on searching for and studies of new mass-accreting pulsating components of a semi-detached Algol-type systems, so called class of oEA stars suggested by Mkrtychian et al. (2002, 2004). oEA components of binaries have been evolved into the instability strip after the first high- mass transfer stage and show δ Sct-like oscillations like classical δ Sct-type stars in well detached eclipsing binary systems, without any history of mass transfer. BD Vir is a 2.548572-day semi-detached Algol type eclipsing binary system with an A8 V primary component, showing long-term orbital period variation (Kreiner, 2004).

The new CCD photometric observations for BD Vir were obtained during 4 nights (February 13, March 13, 31 and April 20, 2017) using the 0.5m telescope of Thai National Observatory in Thailand. All observations were made at the orbital phase interval 0.45-0.72. Johnson B-filter was used, exposures varied from 20 to 80 seconds depending on seeing and the weather conditions. All stars in the field of view were reduced by SExtractor and the Python written codes for differential photometry. Exposures were binned by 4 points to get a better accuracy. The comparison star TYC 6120-50-1 (RA = 13^h27^m16^s.245 DEC= -16°07′45″.85) was used.

Pulsational variations were searched for in the out-of-eclipse parts of the light curve after removal of slow orbital light variations using the low order polynomial fits. Residual light curves are shown in Figure 1. We searched for periodic variations in the residual data by using the Period04 software (Lenz & Breger, 2005).

We applied the Discrete Fourier Transforms (DFT) and the signal pre-whitening techniques for consecutive detection of signals in the data. Steps of DFT analyses and consecutive pre-whitenings of found frequencies are shown in Figure 2 from top to bottom. We detected two pulsation frequencies at 34.159 c/d and 29.735 c/d. Frequencies, amplitudes of oscillations and their accuracies are listed in Table 1.

Conclusion: We discovered short-period pulsational light oscillations in a primary mass-accreting component of the semi-detached eclipsing binary system BD Vir. We conclude, that BD Vir is a new member of oEA group of pulsators suggested by Mkrtychian et al. (2002, 2004).

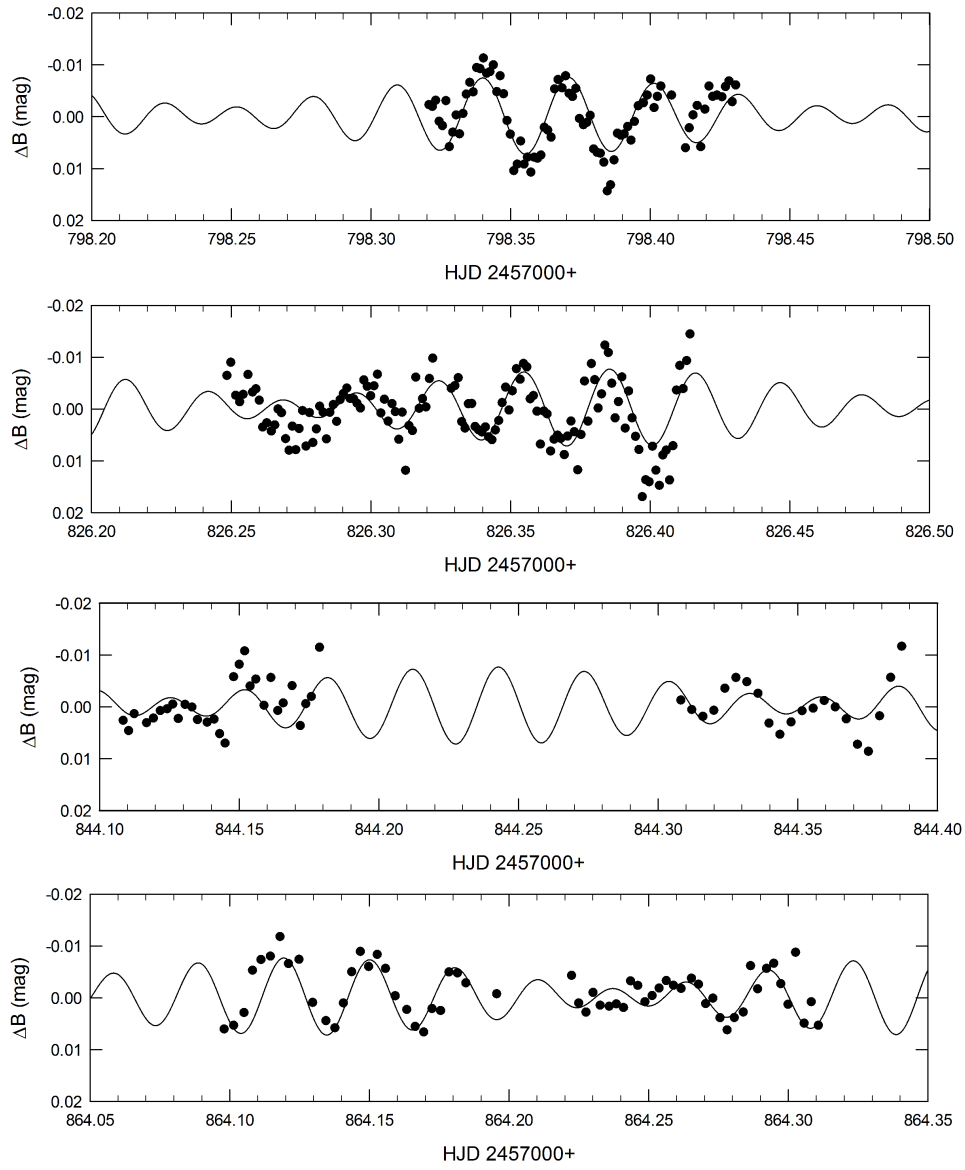


Figure 1. The nightly residual light variations of BD Vir (dots). Solid line is a two frequency fit to the data.

Table 1: Pulsation frequencies and amplitudes.

Frequency (c/d)/(σ)	Amplitude (mag)/(σ)
$f_1=34.1599(4)$	0.0045(2)
$f_2=29.7353(6)$	0.0030(2)

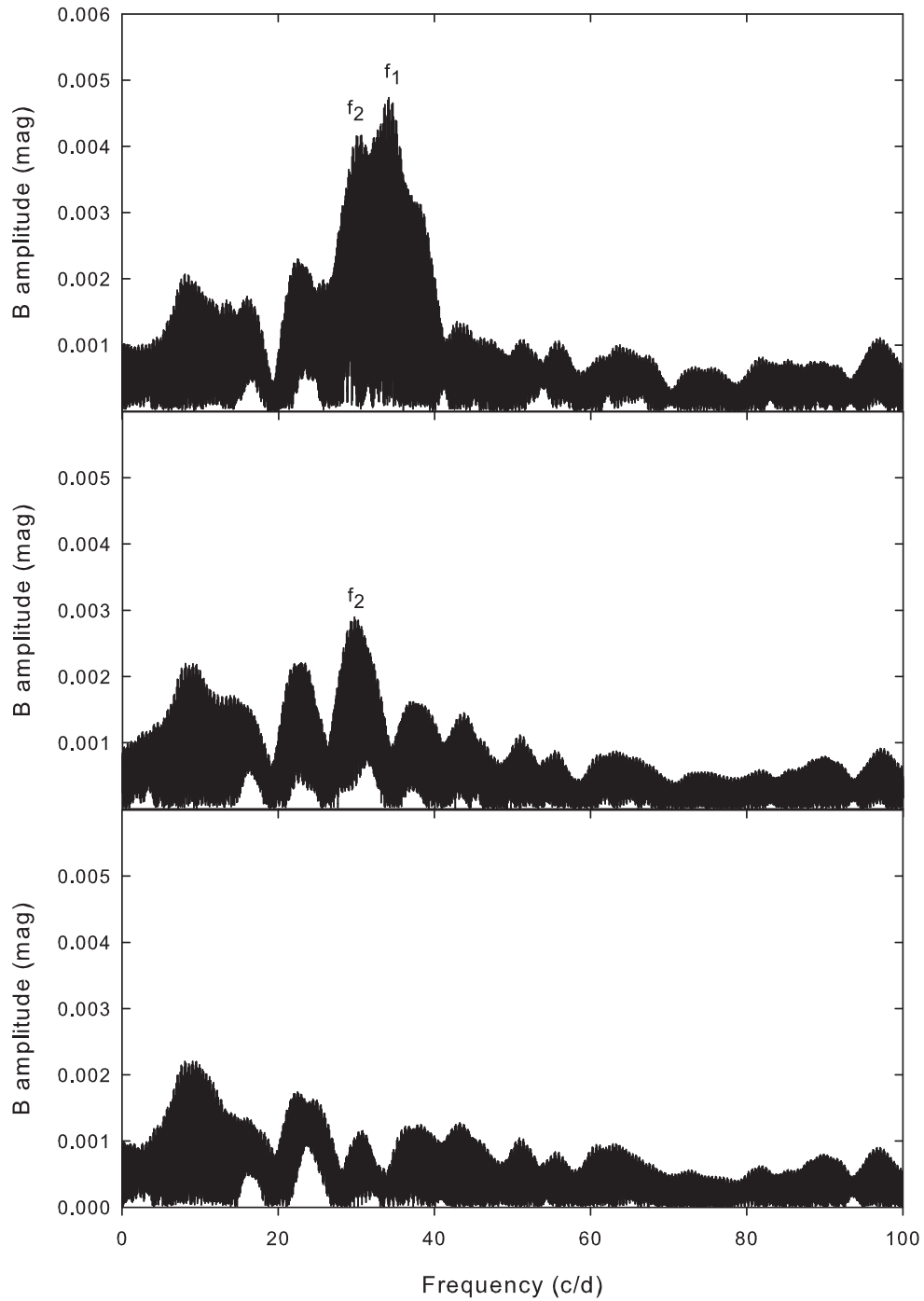


Figure 2. The DFT amplitude spectra of the primary component. Top panel - the DFT of the residual light curve, highest peak is at 34.16 c/d. Middle panel - the DFT of residuals after removal of 34.16 c/d, highest peak at 29.73 c/d. Bottom panel - the DFT after removal of 34.16 and 29.73 c/d.

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References:

Kreiner J.M., 2004, *AcA*, **54**, 207

Lenz P., Breger M., 2005, *Communications in Asteroseismology*, **146**, 53 DOI

Mkrtychian D. et al., 2002, *ASP Conf. Ser.*, **259**, 96

Mkrtychian, D.E., Kusakin, A.V., Rodriguez, E., et al., 2004, *A&A*, **419**, 1015 DOI