

# Variable Star Bulletin

The TESS light curves of three short period Algol-type systems; X Tri is a real pulsator.

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$\delta$  Sct type oscillations have been discovered in component of many binary systems. Currently, more than 230 eclipsing binary systems with a  $\delta$  Sct component are known (Liakos et al. 2022). Primary stars of short-period Algol-type systems TV Cas (B9 V), R CMa (F1 V) and X Tri (A3 V) are also candidates. Reports in this relation of R CMa and X Tri are summarized in Table 1 and 2, respectively. A pulsation has been suspected in TV Cas by Tiwari et al. (2011), however a detailed analysis is yet to be published.

We searched for the high-precision photometry of three systems taken in a 2 minute of the TESS mission (Ricker et al. 2015). The flux measurements labeled SAP\_Flux from the Mikulski Archive for Space Telescopes (MAST) <sup>1</sup> were obtained. The log of observations for each system is given in Table 3.

As a result, quasi-periodic (20 - 40 min.) variations were verified in X Tri, and a typical sample is shown in Figure 1. To search for the dominant frequency, the PERIOD04 software of Lenz & Breger (2005) was used for the out of eclipse part (9127 points) of the light curves, and the signal of  $38.08 \text{ cd}^{-1}$  (period of about 38 min.) was obtained. Considering the spectral type (A3 V) and the pulsational period, the primary component of X Tri is regarded as the  $\delta$  Sct variable. On the other hand, definitive oscillations were not found in TESS light curve of TV Cas and R CMa.

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<sup>1</sup> <https://mast.stsci.edu/portal/Mashup/Clients/Mast/Portal.html>

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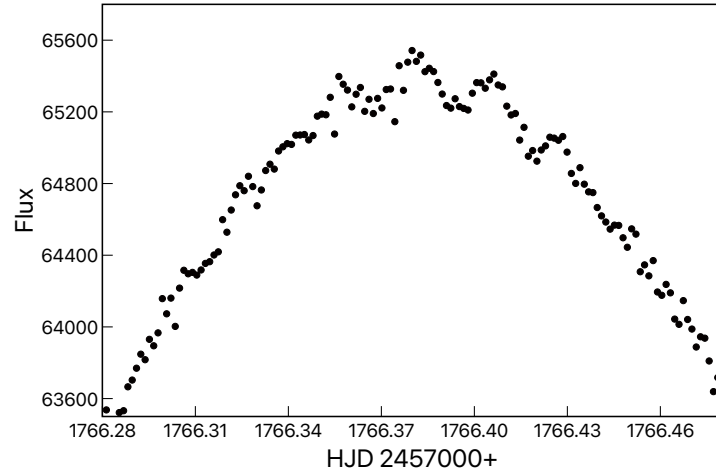


Figure 1: A typical sample of TESS LCs of X Tri (around Max I).

Table 1: Reports concerning the pulsation of R CMa.

Obs. Date	pulsation?	Reference
1955-1956	Yes ( $P_{\text{pul}} = 68$ min.)	Mkrtichian & Gamarova (2000)
2001.01.27	No	Mkrtichian et al. (2006)
2016 Jan., 2017 Jan.	Yes ( $P_{\text{pul}} = 67$ min.)	Lehmann et al. (2018)

Table 2: Reports concerning the pulsation of X Tri

Obs. Date	pulsation?	Reference
2001 Dec.	weak signals around 48 and 32 min.	Kim et al. (2003)
2006 -2008	Yes	Tiwari et al. (2011)
2007 Jun. - 2008 Dec.	No	Liakos & Niarchos (2009)
2010 Oct.	Yes ( $P_{\text{pul}} = 32$ min.)	Turner et al. (2004)
2012 - 13	Yes: ( $P_{\text{pul}} = 29$ min.)	Shimoji (2015)
Jul. - Nov. 2018	Yes ( $P_{\text{pul}} = 36$ min.)	Shirakami (2018)

Table 3: TESS log of observations.

Star	TIC No.	Obs. Date	Sector	Camera
TV Cas	327583823	2019.10.08 - 11.02	17	2
		2019.11.03 - 11.27	18	3
		2020.04.16 - 05.12	24	4
R CMa	409319605	2019.01.08 - 02.01	7	2
		2020.12.18 - 2021.01.13	33	2
		2021.01.14 - 02.08	34	2
X Tri	28391714	2019.10.08 - 11.02	17	1

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