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δ Sct stars in eclipsing binaries: the case of Y Cam

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Eclipsing binary systems with components exhibiting pulsations are excellent laboratories where both pulsation and binarity theories can be combined to obtain very reliable results. In the case of δ Sct-type pulsators, they are very attractive for asteroseismic studies. In particular, the nature of the pulsational modes can be determined using different discrimination methods which use different parts of the orbital period. However, only a few of such systems are presently known, the majority of them having been discovered as pulsators in very recent years. Even much smaller is the number of such systems with detailed studies available in the bibliography. Here we present preliminary results obtained for Y Cam, an Algol-type eclipsing binary system in which the primary component is a δ Sct-type pulsator.

The observations were collected during a three-continent photometric campaign carried out during the Northern winter 2002 – 2003. In total, about 100 nights and 500 hours of useful data were obtained with a time span larger than six months. This means the most extensive time series for this kind of system obtained so far. In particular, complete simultaneous uvby photometry was collected at Sierra Nevada Observatory (SNO) together with a few Crawford H_β data around the orbital phase of first quadrature. They were used to obtain the binary solution of the system using the Wilson-Devinney code while the residuals from the computed binary light curves were then investigated for the pulsational content.

The frequency analysis was performed using the method described by Rodríguez et al. (1998) and Lenz & Breger (2005). This way, the pulsational behaviour was shown to be complex (Table 1) with eight significant peaks detected in the periodograms, all of them in the range 14–20 cd^{-1}. The two main ones form a close frequency pair.

The main excited modes are suggested to be nonradial on the basis of the observed phase shifts and multicolour photometry. As compared with previous work, some of the frequencies are reported in this work for the first time while strong amplitude variations are detected in others.

Frequency (cd^{-1})	Amplitude (mmag)	S/N
	$\pm$0.24	
f_1=15.0456	10.23	20.5
f_2=14.9859	6.70	13.4
f_3=18.3108	6.61	13.2
f_4=14.4460	4.98	10.0
f_5=17.7057	4.22	8.4
f_6=19.7297	2.72	5.4
f_7=14.6239	3.72	7.4
f_8=19.3803	2.72	5.4

Table 1: Results obtained for the combined filter *vby* and SNO data set.

References

Lenz P., Breger M., 2005, Comm. Asteroseis., 146, 5

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Margit Paparó makes a comment.