

Six new close binary systems with O'Connell effect

As part of the VS-COMPAS research program, here are six new objects proposed for which the presence of O'Connell effect in the light curve is clearly noted. All of them are short-periodic close binaries of EW type, except one: NSVS 3878776 is an interesting Beta Lyrae-like system.

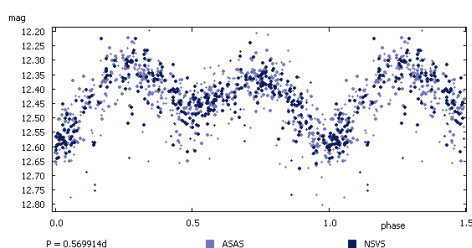
The prototype of EW variables is an eclipsing binary with period less than a day. Like Beta Lyrae stars, the light curve varies continuously, but the depths of the minima are usually similar, though rarely exactly identical. Systems that exhibit such light curves are considered to be close or "contact" binaries. The characteristic shape of an eclipsing binary light curve consists of two out-of-eclipse maxima and two mid-eclipse minima.

Some EW stars are suspected of being magnetically active because the primary and secondary maxima in the light curves have different magnitudes. This phenomenon sometimes referred to as the "O'Connell effect", which can be found in many close binary systems, but often in W-type UMa systems.

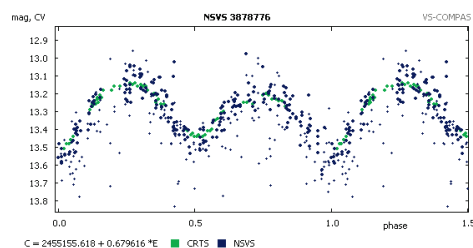
Some theoretical models for explaining the O'Connell effect of close binary stars are based on the hypothesis that the circumstellar material of a binary system is captured by its components.

So far, this asymmetry has not been convincingly explained aside from a few individual systems. Most theories attribute the O'Connell effect to phenomena such as starspots, clouds of circumstellar gas and dust, or a hot spot caused by the impact of a mass-transferring gas stream.

For more detailed theoretical analysis of the effect, please refer to the following paper: "Revisiting the O'Connell Effect in Eclipsing Binary Systems" (Wilsey, Beaky; 2009).

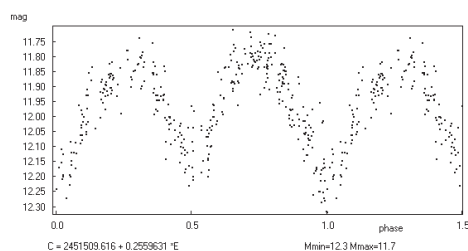


VSX J044611.7-072815 in Eridanus (EW)
by Andrey Prokopovich, Ivan Adamin (VS-COMPAS)

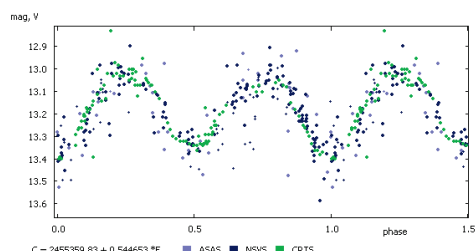


NSVS 3878776 in Andromeda (EB)
by Alexandr Ditkovsky (VS-COMPAS)

Here six binary systems with O'Connell effect are presented, object by object. The light curves are combined using photometric data from different public surveys, such as NSVS, ASAS, CRTS. Such an approach allows to use observation points from different time range, increasing the accuracy of period determination by covering more cycles.



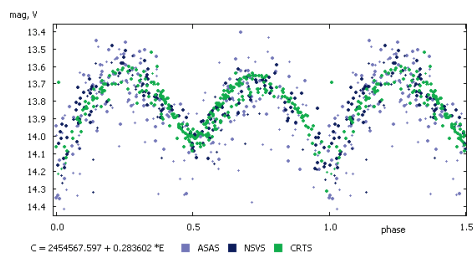
NSVS 4316778 in Auriga (EW)
by Andrey Prokopovich, Ivan Adamin (VS-COMPAS)



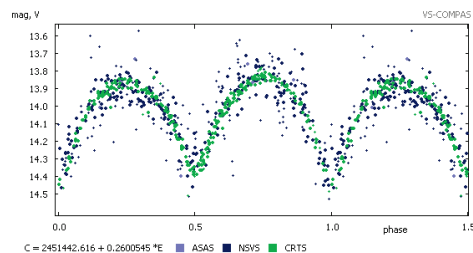
NSVS 8817984 in Pegasus (EW)
by Valery Tshmeystrenko (VS-COMPAS)

NSVS 3878776 is a EB binary orbiting at 0.67962 days period. The secondary minimum is 13.44 CV, while the primary is 13.55 CV.

The next EW - NSVS 8817984 - is from Pegasus and has orbital period of 0.544653d. The light curve shows 13.0 - 13.4 visual magnitude range. The NSVS 4316778 is possibly identical to the X-ray source 1RXS J045947.1+492512 (located 20" NE).



NSVS 13003351 in Sextant (EW/RS)
by Alexandr Ditkovsky (VS-COMPAS)



NSVS 6260959 in Pegasus (EW)
by Valery Tsehmeystrenko (VS-COMPAS)

The last two objects are EWs with similar periods: 0.283602 days for NSVS 13003351 and 0.260055 days for NSVS 6260959. Both stars as bright as 13.8 visually.

Mentioned stars were discovered and analyzed by the VS-COMPAS team members as a part of their photometric surveys data mining program (please, refer to the project's website for details: <http://vs-compas.belastro.net>).

All the data about these binaries is submitted to the VSX catalog, so the objects are available for further research publicly. Magnitudes for Max I and Max II extrema are given to prove the O'Connell effect.

Object Designation	RA (J2000)	DEC (J2000)	Type	Epoch *	Period	Max I	Max II
NSVS 3878776	01 36 13.87	+47 31 07.4	EB	5155.61800	0.679616	13.15CV	13.25CV
VSX J044611.7-072815	04 46 11.79	-07 28 15.2	EW	3704.75300	0.569914	12.32 V	12.36 V
NSVS 4316778	04 59 45.33	+49 25 03.2	EW	1509.61600	0.255963	11.85R1	11.80R1
NSVS 13003351	09 57 47.50	+06 03 19.0	EW/RS	4567.59700	0.283602	13.60 V	13.70 V
NSVS 8817984	22 14 37.86	+28 17 23.1	EW	5359.83000	0.544653	13.00 V	13.10 V
NSVS 6260959	23 29 13.15	+28 23 11.3	EW	1442.61600	0.260055	13.85 V	13.80 V

* Epoch is given as HJD-2450000

Ivan Adamin