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Seven New Variables at the Borderline of Pegasus and Lacerta

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1		USNO B1.0 1240-0526105	22 46 57.72, +34 05 55.2	EA	13.57	13.68	Rc	1.2888	2456534.9124	min		Comm. 1	1_lc.png	1_chart.png	1_HJD.txt
2		USNO B1.0 1242-0521593	22 47 08.02, +34 14 21.6	EW	16.32	17.17	Rc	0.3195	2456535.0196	min		Comm. 2	2_lc.png	2_chart.png	2_HJD.txt
3		USNO B1.0 1241-0519765	22 47 17.68, +34 06 37.2	EW	14.82	15.21	Rc	0.3593	2456536.0430	min		Comm. 3	3_lc.png	3_chart.png	3_HJD.txt
4		USNO B1.0 1242-0521989	22 48 27.69, +34 13 50.9	EW	14.92	15.17	Rc	0.3210	2456542.7549	min		Comm. 4	4_lc.png	4_chart.png	4_HJD.txt
5		USNO B1.0 1242-0522040	22 48 34.85, +34 15 22.0	EA	15.49	15.96	Rc	1.3221	2456568.7226	min		Comm. 5	5_lc.png	5_chart.png	5_HJD.txt
6		USNO B1.0 1240-0526950	22 49 47.54, +34 00 55.8	EB	14.13	14.61	Rc	0.4844	2456536.9041	min		Comm. 6	6_lc.png	6_chart.png	6_HJD.txt
7		USNO B1.0 1240-0527064	22 50 10.69, +34 04 56.3	EW	14.86	15.01	Rc	0.4203	2456536.8371	min		Comm. 7	7_lc.png	7_chart.png	7_HJD.txt

Comments:

1. Secondary minimum: HJD = 2456536.8522.
O'Connell effect (O'Connell 1951) is possible. Alternative period is $0^{d}.5549$. $Min_{II} = 13^{m}.649$.

2. Secondary minimum: HJD = 2456534.8598.
$Min_{II} = 17^{m}.10$.

3. Secondary minimum: HJD = 2456535.8633.
$Min_{II} = 15^{m}.18$.

4. Secondary minima:
HJD = 2456534.8861,

HJD = 2456535.8497,
HJD = 2456536.8155.
Min_{II} = 15^m.13. Variable O'Connell effect is possible. Also there is a flat part on the phase curve in the secondary minimum.

5. Secondary minima:
HJD = 2456159.6101,
HJD = 2456224.3904,
HJD = 2456559.5520.
The phase curve is combined of unfiltered observations, collected in 2012 with Mead 10" (black points); R-filtered observations obtained in 2013 with the same telescope (blue points); and R-filtered observations, made with the T5 telescope of the iTelescope.net observatory (red points).

6. Primary minima:
HJD = 2456535.9370,
HJD = 2456542.7177.
Min_{II} = 14^m.32. O'Connell effect is clearly present. A total eclipse in the primary minimum is possible. The orbital inclination is close to 90°. Another interesting feature is a rather large difference in minima depths: min_I - min_{II} = 0^m.28. Despite the shape of the light curve and the period, which are typical of EW-type binaries, the components of this binary do not show thermal contact.

7. Min_{II} = 14^m.97.

Remarks:

The field centered at RA=22^h48^m, Dec=+34°23′ (2000.0) has been chosen to search for new variable stars: it contained no known variables. The initial unfiltered observations were made at the Montecatini Val Di Cecina Astronomical Centre in Italy using the 10" Mead telescope, equipped with a SBIG KAF 1600 CCD camera, the field of view being 19′×28′.4. We searched for new variables using C-Munipack software and found 3 new variable stars (#2, #4 and #5). Maximum quantum efficiency of the camera turned out to be between the standard Rc and V bands, thus we decided to acquire new filtered observations.

Our R-band observations were collected at the iTelescope.net observatory (USA) with 250-mm Takahashi Epsilon telescope equipped with an ST-10XME CCD camera. As the field of view of this telescope is wider (40′.4×60′), we have discovered additional 4 variable stars. Thus, altogether we have discovered 7 new variables, which all turned out to be binary stars of different types. The finding charts (10′×10′) are attached.

The comparison stars are:

USNO-B1.0 1242-0521580 ($22^h47^m03^s$.641; +34°15′31″.29; R = 12^m.238),

USNO-B1.0 1241-0519783 ($22^h47^m21^s$.808; +34°11′07″.61; R = 13^m.984),

USNO-B1.0 1241-0519638 ($22^h46^m49^s$.329; +34°10′02″.63; R = 13^m.525);

the star numbers are from the USNO B1.0 catalog (Monet et al. 2003).

The magnitudes of these stars were derived using the SeqPlot program.

To search for the periods of new variables, their initial epochs and extrema we used Peranso software. The periods were determined by the Lafler–Kinman method (Lafler & Kinman 1965).

For each variable star, minima timings were calculated as described by Kwee & van Wörden (1956).

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