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A Study of Seven Known Variable Stars

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#	Name	Other	Coord (J2000)	Type	Max	Min	System	Period	Epoch (JD)	type	Sp	Comment	L.Curve	Find.Chart	Data
1	V449 Per	TYC 2334 00280 1	02 57 33.46, +35 14 01.0	EB	11.93	12.40	R	0.47310336	2451495.0873	min		Comm. 1	1.PNG		NSVS 6593151
2		USNO-A2.0 1425-04674821	03 56 52.79, +53 16 40.8	EA	13.0	13.45	R	3.0142	2451497.101	min		Comm. 2	2.PNG		NSVS 1985024 NSVS 2083989
3	UZ Men	GSC 9372-00396	04 10 15.66, -79 26 53.0	RRC	13.4	14.0	V	0.342614	2453400.346	max		Comm. 3	3.PNG		ASAS 041015-7926.9
4		TYC 3036 00098 1	14 36 31.67, +38 43 34.7	EB	12.45	12.75	R	0.42667	2451345.672	min		Comm. 4	4.PNG		NSVS 5107691 NSVS 5145375 NSVS 7755848 NSVS 7763049
5		GSC 7852-00143	16 12 01.40, -38 40 27.6	INT:	11.8	12.2	V	(see Comments)	(see Comments)	other	K5	Comm. 5	5.PNG		ASAS 161201-3840.5
6		TYC 9293 01369 1	17 36 35.97, -71 06 46.0	E/RS	11.05	11.7	V	(see Comments)	(see Comments)	other		Comm. 6	6.PNG		ASAS 173636-7106.8
7		TYC 3214 02097 1	22 47 21.42, +39 09 22.1	DSCT	12.1	12.4	R	0.095256	2451423.518	max		Comm. 7	7.PNG		NSVS 6124972 NSVS 8920847

Comments:

1. The variability of V449 Per was discovered by Hoffmeister (1967). The information presented in the GCVS is based on Busch et al. (1979): Algol (type EA/KE), Min = JD 2438739.276 + 0.946204 x E, 12.7 - 13.3 - 13.3 (p). According to ROTSE-I/NSVS data, the star actually belongs to the EB type with a period twice shorter than that suggested in the GCVS. We derive the normal minimum JD 2451495.084 +/- 0.001 from the NSVS data. To improve the period, we made use of 9 times of minima published in the IBVS and the epoch from the GCVS.

Reference	JD
GCVS	38739.276
Hübscher et al. 2006	49569.5532
Agerer 1999	51138.3650
NSVS, this paper	51495.084
Nelson 2003	52517.9391
Hübscher et al. 2005	53302.3442
Hübscher et al. 2005	53316.5301
Hübscher et al. 2005	53407.3731
Hübscher et al. 2006	53651.4936
Hübscher et al. 2006	53652.4395
Dvorak 2006	53683.667

Earlier, R.H. Nelson combined all these minima in an O-C diagram with the old period (http://www.aavso.org/bob-nelsons-o-c-files). The tabulated elements are in a good agreement with the epoch JD 2452500.905 suggested by Kreiner (2004).
MinII = 12.08. The ROTSE data with photometric correction flags (usually rejected) were kept for the analysis. The use of these data considerably increases the number of available observations without deteriorating quality and allows us to determine the period more accurately.

2. The variability of USNO-A2.0 1425-04674821 was discovered by Hoffman et al. (2009). They found the star to be an eclipsing binary (type E) with the period of 5.93478 d. I reinvestigated the star using the same ROTSE-I data. I confirm the eclipsing nature of the variable, but actually it is an Algol (EA) star with a quite different period (see the Table) and a secondary minimum away from the phase 0.5, indicating an eccentric binary.
D = 0.11P. MinII = 13.45:, MinII - MinI = 0.545P. J-H = 0.292 (2MASS). The ROTSE data with photometric correction flags (usually rejected) were kept for the analysis, but data points with uncertainties in excess of 0.1m were removed.

3. The variability of UZ Men was reported by Knigge (1973). The system is listed in the GCVS as an L-type (slow irregular) variable. Pojmański (2002) suggested the Cepheid classification with the period of 1.0912 d. Actually, this is an RR Lyrae star (RRC subtype) with a much shorter period.
M-m = 0.33P. J-H = 0.227 (2MASS).

4. The variability of TYC 3036 00098 1 was discovered by Akerlof et al. (2000). The variable was classified as an RR Lyrae star (RRC subtype), with the period of 0.21340901 d. I reinvestigated the star using the same ROTSE-I data and found it to be an EB eclipsing binary with a twice longer period.
MinII = 12.6. The Tycho2 color index B-V = 0.796 is probably wrong. J-H = 0.205 (2MASS).

5. The variable is known as SSTc2d J161201.4-384028, a T Tau star, a young stellar object in the region of dark nebulae (Krautter et al. 1997, Wichmann et al. 1997, Sartori et al. 2003, Cieza et al. 2007). The ASAS-3 catalog (Pojmański, 2002) lists the variable as a Cepheid (DCEP-FO/DCEP-FU) with the period of 2.814072 d. Our analysis of the ASAS-3 data reveals the presence of brightness variations simultaneously with two periods:
JD(max) = 2453601.74 + 2.81255 x E,
JD(max) = 2453603.10 + 2.27816 x E.
The object is associated with the X-ray source 1RXS J161201.4-384027. J-H = 0.625 (2MASS). Periodic brightness variations of young stars are usually related to axial rotation of spotted stars. The simultaneous presence of two periods deserves a special study.

6. The variability of the star was reported by Pojmański (2002) who found it to be a Cepheid with the period of 2.8421 d. Actually, its brightness variations can be explained as a superposition of an eclipsing light curve charactersitic of systems with ellipsoidal components and a sine-shaped wave with a slightly longer period, resembling distorsion waves on the light curves of RS CVn variables. The light elements for the sine wave are:
JD(max) = 2453601.65 + 2.84455 x E,
and for the eclipsing curve:
JD(min) = 2453600.27 + 2.84304 x E.
The migration period of the wave on the eclipsing phased curve is at least 5000 d. The variable is associated with the X-ray source 1RXS J173636.6-710652. B-V = 1.460 (Tycho2), J-H = 0.647 (2MASS).

7. The star's variability was discovered by J.S. Shaw et al. (http://hal.physast.uga.edu/~jss/nsvs/). The variable was found to be a High-Amplitude Delta Scuti star (HADS) with the period of 0.10529850 d. I reinvestigated the star using the same ROTSE-I data. The period suggested by Shaw et al. is a one-day alias of the real one (see the Table).
M-m = 0.37P. B-V = 0.407 (Tycho2), J-H = 0.173 (2MASS). The ROTSE data with photometric correction flags (usually rejected) were kept for the analysis.

Remarks:

I present my investigation of seven known variable stars based on ROTSE-I (Woźniak et al. 2004) and ASAS-3 (Pojmański 2002) data. These observations were analyzed using the period-search software developed by Dr. V.P. Goranskij for Windows environment. For the studied stars, previously suggested light elements and/or variability types were found wrong. The coordinates were drawn either from the Tycho-2 or from the 2MASS catalogs.

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References:

Agerer, F., Dahm, M., Hübscher, J., 1999, IBVS, No. 4712
Akerlof, C., Amrose, S., Balsano, R., et al., 2000, Astron. J., 119, 1901
Busch, H., Häßler, K., Splittgerber, E., 1979, Veröff. Sternw. Sonneberg, 9, 125
Cieza, L., Padgett, D.L., Stapelfeldt, K.R., et al., 2007, Astrophys. J., 667, 308
Dvorak, S.W., 2006, IBVS, No. 5677
Hoffman, D.I., Harrison, T.E., McNamara, B.J., 2009, Astron. J., 138, 466
Hoffmeister, C., 1967, Astron. Nachr., 289, 205
Hübscher, J., Paschke, A., Walter, F., 2005, IBVS, No. 5657
Hübscher, J., Paschke, A., Walter, F., 2006, IBVS, No. 5731
Knigge, R., 1973, IBVS, No. 765
Krautter, J., Wichmann, R., Schmitt, J.H.M.M., et al., 1997, Astron. Astrophys. Suppl. Ser., 123, 329
Kreiner, J.M., 2004, Acta Astron., 54, 207
Nelson, R.H., 2003, IBVS, No. 5371
Pojmański, G., 2002, Acta Astron., 52, 397
Sartori, M.J., Lépine, J.R.D., Dias, W.S., 2003, Astron. Astrophys., 404, 913
Wichmann, R., Krautter, J., Covino, E., et al., 1997, Astron. Astrophys., 320, 185
Woźniak, P.R., Vestrand, W.T., Akerlof, C.W., et al., 2004, Astron. J., 127, 2436