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TIMES OF MINIMUM OF ECLIPSING BINARIES FROM ROTSE1 CCD DATA, III: VARIABLES CLASSIFIED AS TYPE E

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In the third installment of this series of papers (Diethelm, 2001a and 2001b), we report the timings of minimum light of newly discovered variables from ROTSE1 (Robotic Optical Transient Search Experiment 1) survey data, as reported in Akerlof et al. (2000). The original data are publicly available through the Internet (http://www.umich.edu/~rotse).

Table 1 contains the times of minimum of 73 stars whose variability was discovered for the first time by the ROTSE1 team and classified as E type eclipsing binaries, ordered according to RA. In each case, the data have been folded into a seasonal light curve using the ROTSE1 period or twice that value (see also Table 2). The time of minimum was then found with the help of the Kwee–Van Woerden algorithm (Kwee and Van Woerden, 1956). Since the CCD measurements of the ROTSE1 survey were obtained in a random fashion as viewed from the variable stars period, the phase coverage of the individual light curves is sometimes less than pleasing. It must also be noted that some of the variables have double entries in the ROTSE1 catalogue, the second identifier being given in the second row of the variables data in Table 1.

With the purpose of aiding prospective investigators of theses variables, we give in Table 2 the basic light curve parameters as deduced from the ROTSE1 photometry. Due to the uneven phase coverage, some of the given parameter values are rather uncertain and we would like to point out the necessity of in-depth studies of these stars. As far as we know, such a study has been instigated by the AAVSO (for ROTSE1 J170250.47+213959.0 see Lubcke et al., 2000; ROTSE1 J165241.80+124905.2, ROTSE1 J170610.49+495523.6, ROTSE1 J174103.55+273429.1 and ROTSE1 J181941.87+501037.3 in progress) as well as by members of the BBSAG.

Among the stars assigned to the E type by the ROTSE1 team, we find some to be questionably classified. ROTSE1 J141308.66+295950.7 = GSC 2013.854 is a δ Scuti variable with a period of $0\overset{d}{.}141084$ and an amplitude of $0\overset{m}{.}3$ (13.2–13.5). The light curves of the four stars ROTSE1 J173012.01+141446.4 = GSC 1004.171, ROTSE1 J173334.66 = GSC 3087.1020, ROTSE1 J175053.54+265448.8 = GSC 2085.1541 and ROTSE1 J190111.36+460037.7 = GSC 3541.692, folded with the period value as determined by the ROTSE1 team, all show peculiarities which make the classification as eclipsing binaries unlikely.

In the 'remarks' column of Table 2, D and d stand for the duration of the minimum and of totality, respectively, while the suffixes p and s denote primary and secondary minimum.

Table 1: Times of minimum of eclipsing binaries

ROTSE1 Variable	Min.	JD(hel,min) − 2400000	Est. err.	ROTSE1 Variable	Min.	JD(hel,min) − 2400000	Est. err.
J123201.49+352959.7 =	s	51251.691	0.002	J165039.95+274420.0 =	s	51265.8329	0.0004
= GSC 2530.2276	p	51312.7322	0.0004	= GSC 2066.1210 =	p	51265.9804	0.0004
J123309.33+375820.2 =	s	51251.812	0.003	= J165039.99+274421.1			
= GSC 3018.1509	p	51286.7110	0.0012	J165241.80+124905.2 =	s	51265.842	0.003
J123730.26+260451.8 =	p	51260.8579	0.0009	= GSC 983.1044	p	51311.91	0.02
= GSC 1990.1198	s	51288.876	0.005	J165252.60+383930.6 =	p	51258.867	0.002
J125214.17+385630.8 =	s	51278.719	0.003	= GSC 3071.260 =	s	51274.8909	0.0008
= GSC 3021.507	p	51304.736	0.002	= J165252.61+383930.4			
J133619.29+292341.1 =	p	51312.729	0.002	J165551.74+245335.9 =	p	51259.8648	0.0008
= GSC 2004.1075				= GSC 2063.902 =	s	51287.8691	0.0008
J140916.76+383732.0 =	-	51259.8645	0.0009	= J165551.78+245336.1			
= GSC 3034.593				J165656.96+291907.1 =	s	51244.014	0.005
J141451.43+273415.3 =	p	51259.8633	0.0004	= GSC 2071.671	p	51283.779	0.006
= GSC 2013.1067	s	51260.8551	0.0014	J165819.76+334022.8 =	s	51243.9841	0.0002
J143723.34+380442.7 =	s	51275.865	0.003	= GSC 2594.1289 =	p	512295.8786	0.0004
= GSC 3036.930 =	p	51286.7052	0.0006	= J165819.81+334022.2			
= J143723.43+380442.1				J165924.08+151220.7 =	s	51274.918	0.003
J143820.20+363225.6 =	s	51260.8547	0.0007	= GSC 1522.599	p	51323.9074	0.0010
= GSC 2560.421 =	p	51311.7377	0.0004	J165930.95+191256.1 =	p	51288.8869	0.0004
= J143820.24+363225.5				= GSC 1530.1382			
J144005.64+263401.6 =	s	51278.700	0.005	J170101.20+492314.7 =	p	51265.8278	0.0015
= GSC 2018.65 =	p	51286.681	0.003	= GSC 3504.856	s	51308.7177	0.0014
= J144005.69+263402.2				J170250.47+213959.0 =	p	51288.7439	0.0007
J145312.48+284221.4 =	p	51229.863	0.007	= GSC 1534.753	s	51306.8893	0.0004
= GSC 2023.1133	s	51286.76	0.04	J170610.49+495523.6 =	p	51307.706	0.003
J145730.93+240251.4 =	p	51258.8604	0.0009	= GSC 3504.168			
= GSC 2017.1099	s	51265.8135	0.0017	J170922.13+123957.6 =	p	51275.8837	0.0009
J150029.61+334021.7 =	p	51221.8497	0.0005	= GSC 985.811			
= GSC 2565.667	s	51287.859	0.011	J171059.94+461719.7 =	p	51285.7006	0.0005
J151726.64+381336.3 =	p	51223.8574	0.0010	= GSC 3501.2083	s	51306.873	0.005
= GSC 3045.520	s	51286.717	0.007	J171130.30+231411.2 =	s	51287.81	0.02
J152155.16+335604.1 =	-	51222.8497	0.0012	= GSC 2061.529	p	51310.903	0.005
= GSC 2566.776	-	51275.875	0.002	J171642.01+212305.9 =	p	51274.9115	0.0017
J161005.08+253654.9 =	p	51275.8724	0.0007	= GSC 1548.713	s	51310.920	0.007
= GSC 2038.674	s	51288.8774	0.0007	J171649.91+382159.8 =	s	51265.78	0.01
J161050.39+372857.0 =	p	51242.813	0.002	= GSC 3073.1983	p	51307.745	0.004
= GSC 2579.69	s	51248.795	0.005	J171727.89+271301.9 =	p	51286.8856	0.0017
J162108.79+253924.1 =	p	51286.881	0.002	= GSC 2069.150	s	51287.724	0.004
= GSC 2047.270				J171824.82+222850.0 =	p	51274.9145	0.0006
J163153.48+252717.2 =	s	51258.851	0.002	= GSC 1548.678	s	51304.7652	0.0012
= GSC 2048.120	p	51275.853	0.002	J172007.77+133956.4 =	p	51283.7995	0.0013
J163213.55+133847.6 =	p	51252.844	0.002	= GSC 990.545	s	51308.770	0.007
= GSC 972.932	s	51281.93	0.02	J172142.55+405423.5 =	s	51265.918	0.007
J163516.73+124618.9 =	p	51310.7734	0.0011	= GSC 3090.1337	p	51311.884	0.009
= GSC 968.535				J172303.57+175701.2 =	p	51295.891	0.002
J164508.42+203701.5 =	p	51295.8959	0.0014	= GSC 1541.2560	s	51322.7706	0.0012
= GSC 1528.683	s	51323.907	0.004	J172441.74+135356.5 =	s	51283.7923	0.0011
J164755.15+351756.5 =	s	51259.861	0.013	= GSC 1003.1915	p	51306.9009	0.0005
= GSC 2588.69	p	51308.870	0.003	J172601.97+304710.4 =	s	51288.4	0.2
J163213.55+133847.6 =	p	51252.844	0.002	= GSC 2605.545	p	51304.90	0.04
= GSC 972.932	s	51281.93	0.02	J172659.31+244147.6 =	p	51265.8307	0.0015
J163516.73+124618.9 =	p	51310.7734	0.0011	= GSC 2079.1360			
= GSC 968.535				J172741.29+274503.5 =	p	51291.827	0.003
J164508.42+203701.5 =	p	51295.8959	0.0014	= GSC 2083.557			
= GSC 1528.683	s	51323.907	0.004	J172817.01+211557.0 =	p	51278.7902	0.0012
J164755.15+351756.5 =	s	51259.861	0.013	= GSC 1550.1808			
= GSC 2588.69	p	51308.870	0.003	J173621.16+303212.7 =	p	51295.868	0.003
				= GSC 2606.1006			

Table 1: (cont.)

ROTSE1 Variable	Min.	JD(hel,min) − 2400000	Est. err.	ROTSE1 Variable	Min.	JD(hel,min) − 2400000	Est. err.
J173921.13+354208.6 =	p	51286.7253	0.0019	J182138.35+421008.6 =	-	51310.8700	0.0011
= GSC 2618.1282	s	51304.7388	0.0015	= GSC 3112.179			
J174103.55+273429.1 =	p	51296.743	0.005	J182301.05+400833.0 =	s	51258.842	0.002
= GSC 2084.777	s	51308.8718	0.0017	= GSC 3108.1692 =	p	51288.851	0.003
J174150.84+475104.3 =	s	51243.938	0.004	= J182301.06+400833.1			
= GSC 3514.790	p	51312.7161	0.0008	J183907.69+415653.5 =	p	51257.8337	0.0015
J174323.11+475142.3 =	s	51274.8757	0.0017	= GSC 3113.1384	s	51261.8328	0.0012
= GSC 3514.864	p	51275.8589	0.0011	J185343.48+372338.0 =	s	51274.935	0.008
J174555.29+523805.8 =	s	51280.8477	0.0008	= GSC 2650.1900	p	51280.844	0.004
= GSC 3889.1362	p	51306.863	0.003	J185901.50+522814.9 =	s	51306.92	0.02
J174743.80+463230.6 =	p	51243.9763	0.0015	= GSC 3553.1117	p	51310.79	0.05
= GSC 3510.396	s	51311.871	0.004	J191518.85+522933.9 =	s	51280.863	0.005
J174953.04+370839.6 =	p	51265.8306	0.0009	= GSC 3554.949	p	51297.8838	0.0013
= GSC 2619.833				J191533.92+443704.9 =	p	51297.859	0.002
J175852.80+481025.0 =	s	51286.858	0.004	= GSC 3133.1149			
= GSC 3515.865	p	51304.8686	0.0009	J192506.85+455603.1 =	p	51277.8307	0.0013
J175909.41+493607.4 =	p	51277.8466	0.0007	= GSC 3543.1026 =	s	51312.699	0.005
= GSC 3519.401	s	51308.714	0.004	= J192506.86+455603.0			
J181521.80+390545.4 =	-	51257.829	0.002	J192531.82+425110.1 =	p	51286.8516	0.0014
= GSC 3103.919 =	-	51311.7397	0.0013	= GSC 3142.528	s	51306.688	0.005
= J181521.82+390544.8				J193206.64+523706.3 =	p	51295.843	0.002
J181941.87+501037.3 =	p	51274.858	0.010	= GSC 3921.991	s	51311.724	0.005
= GSC 3533.1400				J193658.15+474828.1 =	-	51257.8458	0.0015
J182102.31+443841.1 =	p	51305.710	0.004	= GSC 3560.1105	-	51277.859	0.004
= GSC 3116.1047 =	s	51323.864	0.002				
= J182102.34+443840.5							

Table 2: Basic parameters of eclipsing binaries light curves

ROTSE1 Variable	Type	Period (days)	$m_{\rm max}$	$m_{\rm p}$ (mag)	$m_{\rm s}$	Remarks
J123201.49+352959.7	EB:	0.30599(2)	13.6	14.4	14.2	
J123309.33+375820.2	EA	0.49498(5)	12.7	13.2:	12.8	pronounced reflection effect ($0\overset{\rm m}{.}2$)
J123730.26+260451.8	EW	0.35684(5)	12.8	13.3	13.2	$d_{\rm p} = 0\overset{\rm p}{.}09$, $d_{\rm s} = 0\overset{\rm p}{.}11$
J125214.17+385630.8	EB	0.64244(9)	12.0	12.3	12.2	
J133619.29+292341.1	EA	1.24931(2)	12.5	13.2	12.6:	$D = 0\overset{\rm p}{.}09$:
J140916.76+383732.0	EW:	0.42695(7)	12.3	12.6	-	
J141451.43+273415.3	EW	0.65957(8)	11.9	12.3	12.2	
J143723.34+380442.7	EA	1.0335(2)	11.3	11.8	11.4	$D = 0\overset{\rm p}{.}15$, $d = 0\overset{\rm p}{.}03$
J143820.20+363225.6	EA	0.47778(2)	10.3	10.8	10.7	$D = 0\overset{\rm p}{.}17$
J144005.64+263401.6	EA	3.198(1)	10.8	11.2	11.1	$D = 0\overset{\rm p}{.}18$, $d = 0\overset{\rm p}{.}04$
J145312.48+284221.4	EA	3.077(2)	12.0	12.4	12.1:	$D = 0.09$
J145730.93+240251.4	EB	0.81880(7)	11.1	11.4	11.15	
J150029.61+334021.7	EA	1.25695(6)	11.4	12.0	>11.5	$D = 0\overset{\rm p}{.}14$:
J151726.64+381336.3	EB	0.56896(7)	12.1	12.4	12.3	
J152155.16+335604.1	EA	0.48872(2)	13.1	13.7	13.7:	$D = 0\overset{\rm p}{.}10$
J161005.08+253654.9	EA	0.53083(2)	12.5	13.2	13.1	$D = 0\overset{\rm p}{.}15$
J161050.39+372857.0	EA	0.7037(1)	12.8	13.5	13.0	$D = 0\overset{\rm p}{.}18$
J162108.79+253924.1	EA	0.5615(2)	12.1	>12.5	12.2:	$D = 0\overset{\rm p}{.}16$:, $d \neq 0^{\rm p}$(?)
J163153.48+252717.2	EB	0.8292(3)	12.2	12.6	12.4	
J163213.55+133847.6	EA	2.324(1)	12.0	12.4	12.1	$D = 0\overset{\rm p}{.}16$
J163516.73+124618.9	EA	1.0538(7)	12.0	>12.2		$D = 0\overset{\rm p}{.}11$:
J164508.42+203701.5	EA	1.4367(3)	12.1	12.5	12.45	$D = 0\overset{\rm p}{.}12$
J164755.15+351756.5	EB	0.6853(3)	13.4	13.7	13.6	
J165039.95+274420.0	EW	0.29802(1)	11.8	12.4	12.25	
J165241.80+124905.2	EA	0.81526(8)	13.0	14.0:	13.5	$D = 0\overset{\rm p}{.}12$:
J165252.60+383930.6	EA	0.9712(2)	10.9	>11.4	11.2	$D = 0\overset{\rm p}{.}14$
J165551.74+245335.9	EW	0.39165(3)	11.6	12.1	12.0	
J165656.96+291907.1	EA	1.3015(2)	12.0	12.3	12.15	$D = 0\overset{\rm p}{.}18$:
J165819.76+334022.8	EW	0.26818(1)	11.8	12.4	12.3	noticeable O'Connell effect
J165924.08+151220.7	EA	0.50779(3)	12.4	13.0	12.8:	$D = 0\overset{\rm p}{.}17$, RS CVn-like wave

Table 2: (cont.)

ROTSE1 Variable	Type	Period (days)	m_{max}	m_p (mag)	m_s	Remarks
J165930.95+191256.1	EA	1.1137(2)	12.5	13.0:		$D = 0^{p}.14$:
J170101.20+492314.7	EA	1.1143(3)	11.6	>12.1	11.8	$D = 0^{p}.21$
J170250.47+213959.0	EB	0.51115576	12.0	13.1	12.45	see Lubcke et al., 2000
J170610.49+495523.6	EA:	0.41035(2)	13.3	>14.0		four discordant measurements
J170922.13+123957.6	EA	1.3276(2)	11.8	12.3	12.3:	$D = 0^{p}.17$
J171059.94+461719.7	EB	0.51024(5)	10.9	11.4	11.15	
J171130.30+231411.2	EA	4.211(4)	12.5	12.95	12.55:	$D = 0^{p}.17$:
J171642.01+212305.9	EB	0.7273(1)	10.8	11.2	11.0	
J171649.91+382159.8	EA:	1.4736(6)	12.4	12.9	12.55	$D = 0^{p}.17$
J171727.89+271301.9	EB	0.5582(1)	12.5	12.8	12.7	
J171824.82+222850.0	EW	0.37084(3)	12.2	12.65	12.55	
J172007.77+133956.4	EB	0.6483(1)	11.9	12.3	12.1	
J172142.55+405423.5	EB	1.876(1)	10.2	10.3	10.25	
J172303.57+175701.2	EA	0.9434(1)	11.8	12.2	12.1	$D = 0^{p}.14$
J172441.74+135356.5	EW	0.45757(4)	11.3	11.8	11.7	noticeable O'Connell effect
J172601.97+304710.4	EA	10.93(5)	12.6	13.8	12.8	$D = 0^{p}.10$:
J172659.31+244147.6	EA	0.59943(6)	11.9	12.4	11.95	$D = 0^{p}.23$
J172741.29+274503.5	EA	1.5768(7)	12.1	12.8		$D = 0^{p}.26$:, period to be doubled?
J172817.01+211557.0	EA	1.2979(3)	11.4	12.0:		$D = 0^{p}.17$
J173621.16+303212.7	EA	1.658(2)	10.8	11.0		$D = 0^{p}.14$:
J173921.13+354208.6	EW	0.34314(7)	11.3	11.6	11.55	
J174103.55+273429.1	EW	0.39782(2)	11.5	12.1:	12.0	
J174150.84+475104.3	EB	0.53950(5)	11.8	12.3	12.0	
J174323.11+475142.3	EW:	0.39426(4)	12.4	13.0	12.85	
J174555.29+523805.8	EB	0.61210(7)	12.0	12.55	12.3	
J174743.80+463230.6	EB	0.48667(7)	12.3	13.0	12.7	
J174953.04+370839.6	EA	1.2661(2)	12.0	13.5	12.05	$D = 0^{p}.26$:
J175852.80+481025.0	EB	0.53778(6)	11.3	11.75	11.55	
J175909.41+493607.4	EA	0.58802(9)	12.7	13.2	12.85	$D = 0^{p}.23$
J181521.80+390545.4	EA	1.2396(1)	11.9	12.3	12.25	$D = 0^{p}.13$
J181941.87+501037.3	EA	0.64596(2)	11.6	>13.0		$D = 0^{p}.28$:
J182102.31+443841.1	EA	1.2524(1)	11.7	12.3	12.2	$D = 0^{p}.16$
J182138.35+421008.6	EA	0.9927(1)	10.6	11.0		$D = 0^{p}.14$, l. c. very unevenly sampled
J182301.05+400833.0	EW	0.8706(2)	10.8	11.3	11.3	pronounced O'Connell effect
J183907.69+415653.5	EB	0.53355(8)	12.3	12.7	12.6	
J185343.48+372338.0	EW	0.7870(2)	12.7	13.0:	13.0:	poorly sampled light curve
J185901.50+522814.9	EA	7.60(1)	12.2	12.6	12.35	$D = 0^{p}.11$, RS CVn-like wave
J191518.85+522933.9	EA	0.9716(8)	11.4	11.8	11.7	$D = 0^{p}.14$
J191533.92+443704.9	EA	1.0617(1)	10.5	11.1	10.8:	$D = 0^{p}.12$:
J192506.85+455603.1	EA	1.0729(1)	12.1	12.6	12.5	$D = 0^{p}.15$
J192531.82+425110.1	EW	0.6962(2)	11.6	12.0	11.9	
J193206.64+523706.3	EB	0.9072(2)	11.6	12.1	11.9	
J193658.15+474828.1	EA:	0.8170(1)	11.5	11.75	11.7	$D = 0^{p}.14$:

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