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Evolutionary Changes in the Periods of Cepheids

L. N. Berdnikov[1], V. V. Ignatova[2]

Abstract. Our analysis of O−C diagrams for 230 (mainly northern) Cepheids revealed that periods of 67 of them show evolutionary changes. New parabolic elements for these Cepheids are presented.

The principal objective of our work is to search for evolutionary period changes in the Cepheids. We used Berdnikov's (1992) version of the well-known Hertzsprung method to determine the times of maximum brightness, which were used to construct O−C diagrams for 230 Cepheids. It was found that 67 of these diagrams are parabolic. New parabolic elements for these Cepheids are given in Table 1. For 34 of them (with asterisks) they are the first so obtained.

Table 1. Elements of Cepheids: JD hel Max = $M_0 + PE + qE^2$

	Cepheid	M_0	P	q
	U Aql	2430700.922	7.02394800	.0000000373 ± .0000000036
	SZ Aql	2435648.865	17.13895783	.0000008595 ± .0000000624
*	FM Aql	2436068.796	6.11423687	.0000000153 ± .0000000078
	η Aql	2411999.693	7.17654682	.0000000288 ± .0000000010
	SY Aur	2433424.773	10.14436896	.0000001672 ± .0000000142
*	AO Aur	2433821.305	6.76299238	−.0000001444 ± .0000000138
*	AN Aur	2433879.876	10.29005446	−.0000003062 ± .0000000079
*	CY Aur	2433746.919	13.84829281	−.0000014988 ± .0000001176
*	ER Aur	2439386.452	15.69513453	.0000031747 ± .0000001501
*	RZ CMa	2440227.658	4.25492558	.0000000207 ± .0000000027
*	TW CMa	2441122.328	6.99526746	.0000000749 ± .0000000167
	RS Cas	2433600.317	6.29578905	.0000000563 ± .0000000075
	RW Cas	2432660.523	14.79687547	−.0000027586 ± .0000000610
	RY Cas	2437720.850	12.13805091	.0000004091 ± .0000000555
*	SY Cas	2434146.672	4.07104694	.0000000157 ± .0000000004
	SZ Cas	2432478.995	13.62059366	.0000093183 ± .0000001354
*	VV Cas	2433799.384	6.20727194	−.0000000895 ± .0000000066
*	CH Cas	2439537.362	15.08749075	.0000018122 ± .0000000989
*	CP Cep	2439856.898	17.86086234	.0000029889 ± .0000001364
	δ Cep	2412028.956	5.36636710	−.0000000083 ± .0000000003
	TX Cyg	2433380.763	14.70895531	.0000008817 ± .0000000491

[1]Sternberg Astronomical Institute, 13 Universitetskij pr., Moscow 119899, Russia

[2]Tashkent University and Astronomical Institute, 33 Astronomicheskaya st., Tashkent 700052, Uzbekistan

Table 1. (continued)

	Cepheid	M_0	P	q
	VX Cyg	2433415.338	20.13255216	.0000005980 ± .0000000890
*	VY Cyg	2433412.717	7.85702488	.0000000295 ± .0000000024
	VZ Cyg	2434214.444	4.86451972	−.0000000208 ± .0000000012
	CD Cyg	2433741.130	17.07244967	.0000010724 ± .0000000563
*	IY Cyg	2439196.581	21.75661665	.0000040096 ± .0000003236
*	MW Cyg	2433640.575	5.95465353	.0000000186 ± .0000000018
*	β Dor	2438474.193	9.84245737	.0000000828 ± .0000000135
*	UY Eri	2437505.422	2.21325333	.0000000028 ± .0000000005
	W Gem	2432213.997	7.91414591	−.0000002221 ± .0000000067
	RZ Gem	2435211.728	5.52939152	−.0000000768 ± .0000000058
	ζ Gem	2423838.469	10.15226862	−.0000004939 ± .0000000083
	BL Her	2434885.653	1.30745628	−.0000000008 ± .0000000001
	V Lac	2434173.737	4.98333294	−.0000000562 ± .0000000010
	RR Lac	2434711.505	6.41623290	.0000000187 ± .0000000047
*	V473 Lyr	2429137.170	1.49075826	.0000000019 ± .0000000001
	T Mon	2428652.262	27.01910034	.0000050950 ± .0000002591
*	SV Mon	2435157.368	15.23264154	.0000008060 ± .0000000443
*	UY Mon	2433225.042	2.39818867	.0000000053 ± .0000000004
*	UU Mus	2438267.760	11.63627271	−.0000001104 ± .0000000232
*	U Nor	2433814.024	12.64260969	.0000008818 ± .0000000419
	Y Oph	2436257.563	17.12332994	.0000028229 ± .0000001381
	BF Oph	2433570.224	4.06778231	−.0000000192 ± .0000000013
*	RS Ori	2433778.427	7.56681571	.0000000138 ± .0000000048
*	GQ Ori	2440230.736	8.61626277	.0000001027 ± .0000000164
*	SV Per	2434980.363	11.12917471	.0000001397 ± .0000000156
*	UX Per	2435608.617	4.56577850	−.0000000139 ± .0000000032
*	UY Per	2433775.698	5.36507710	.0000000115 ± .0000000023
*	BM Per	2442394.410	22.95573864	.0000069766 ± .0000005347
	X Pup	2432826.556	25.96227678	.0000029531 ± .0000003386
	AQ Pup	2439446.268	30.01195444	.0002040802 ± .0000406912
	U Sgr	2427345.796	6.74508112	.0000000481 ± .0000000014
	W Sgr	2427432.902	7.59482647	.0000000322 ± .0000000032
	X Sgr	2427032.004	7.01246118	.0000000721 ± .0000000060
*	VY Sgr	2437414.950	13.55791537	.0000002454 ± .0000000206
	V350 Sgr	2438296.254	5.15419053	.0000000189 ± .0000000015
	RY Sco	2435467.942	20.31610684	.0000047223 ± .0000003655
*	Z Sct	2435047.078	12.90156306	.0000001818 ± .0000000421
	RU Sct	2434878.530	19.70130759	.0000033465 ± .0000003329
*	SS Sct	2435627.670	3.67129101	.0000000057 ± .0000000006
*	TY Sct	2436448.500	11.05350863	.0000001395 ± .0000000339
*	EU Tau	2432687.630	2.10226062	.0000000236 ± .0000000057
*	R TrA	2435747.531	3.38928405	−.0000000044 ± .0000000005
	α UMi	2428260.708	3.96925832	.0000001965 ± .0000000063
	S Vul	2426180.606	68.01940256	.00039603 ± .00004321
*	T Vul	2432261.908	4.43552280	−.0000000150 ± .0000000016
	SV Vul	2433354.441	45.08740052	−.000151970 ± .000003481

Reference

Berdnikov, L. N. 1992, Sov. Astr. Lett., 18, 207

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