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New Double-Mode RR Lyrae Variables III

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We present a new study of 123 known RR Lyrae variable stars from the Catalina surveys periodic variable star catalog. We analyzed all observations available for these stars in the Catalina Surveys online public archives using the period-search software developed by Dr. V.P. Goranskij for Windows environment. According to these data, the stars are double-mode RR Lyrae variables, pulsating in the first-overtone and fundamental modes.

1 Introduction

According to the International Variable Star Index (VSX, AAVSO), about 600 double-mode RR Lyrae variable stars are currently known in our Galaxy, usually pulsating in the fundamental and first-overtone radial modes (most of them, outside globular clusters). During the recent years, automated data surveys resulted in a considerable progress in the identification of stars of this type. The author of the present paper, with his co-authors, earlier discovered 112 double-mode RR Lyrae variable stars, pulsating in the fundamental and first-overtone radial modes (Khruslov 2007, 2010, 2011, 2012a,b, 2014, 2015; Khruslov et al. 2013; Antipin and Khruslov 2013; Huemmerich and Khruslov 2014). In this article, I present the discovery of 123 more double-mode RR Lyrae variable stars, pulsating in the first-overtone and fundamental modes.

2 Results

I studied 123 known RR Lyrae variable stars from the Catalina surveys periodic variable star catalog (Drake et al. 2014), analyzing all observations available for them in the Catalina Surveys (Drake et al. 2009) online public archives using the period-search software developed by Dr. V.P. Goranskij for Windows environment. In the Catalina surveys periodic variable star catalog, all these variables are called RRC stars. According to our data, the variables are double-mode RR Lyrae variables, pulsating in the first-overtone and fundamental modes.

Light curves, finding charts, and data (CSS, SSS, MLS) are available online in the html version of this paper as a zip-archive. The light curves are given in the format displayed in Fig. 1. Top panels present data folded with the fundamental-mode and first overtone periods. Bottom panels show the same curves after prewhitening the other oscillation (if the frequencies $f_1 + f_0$ and $f_1 - f_0$ were excluded, it is also noted). These light curves are given for all data series.

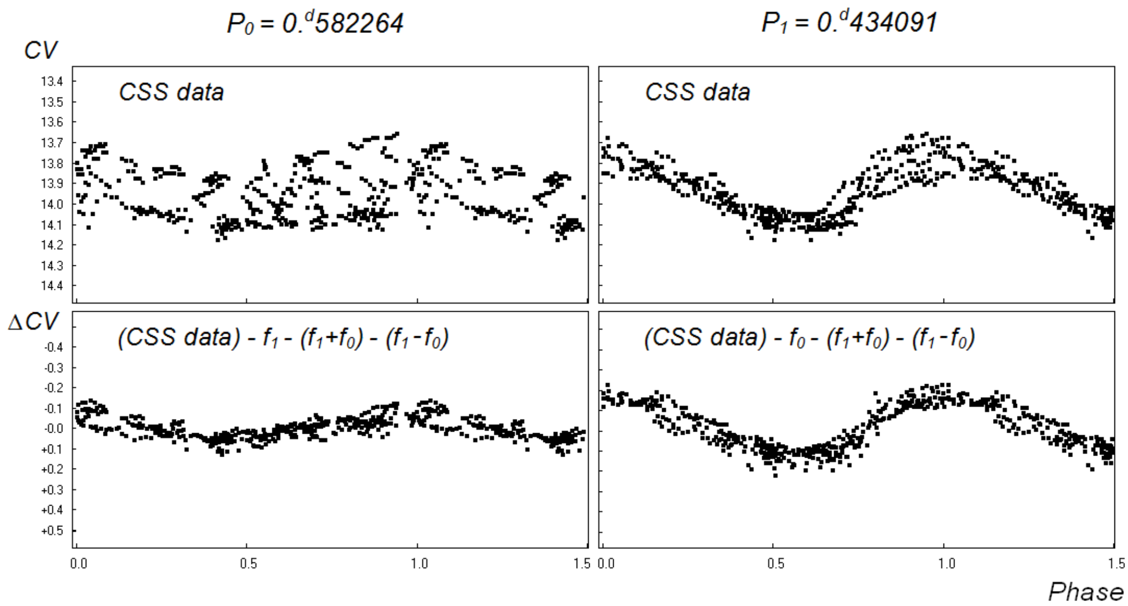

Figure 1.
The light curve of USNO-B1.0 0865-0547700 (No. 101).

Along with the light curves, we present power spectra of the RR Lyrae variables, for the raw data and after subtraction of the first-overtone (or fundamental mode) oscillations, as is shown in Fig. 2. The structure of the power spectra shows that the secondary periods are real.

The period ratios, P_1/P_0, are typical of radially pulsating double-mode RR Lyrae stars. The Petersen diagram for double-mode RR Lyrae variables of this article is displayed in Fig. 3.

There are several cases of wrong periods in the Catalina surveys periodic variable star catalog: for Nos. 1, 5, 19, 22, 55, and 72, the period given by them is a one-day alias of the true first overtone period; for Nos. 42 and 87, the period is a one-day alias of the true fundamental mode period.

The star designations are from the USNO-B1.0 catalog (Monet et al. 2003). The tabulated coordinates of the variables were drawn from either the GSC2.3 (Lasker et al. 2008) or 2MASS (Skrutskie et al. 2006) catalogs.

For all stars,the Catalina Sky Survey (CSS) data were used in the analysis. Additionally, we used the Mount Lemmon Survey (MLS) data for Nos. 8, 10, 13, 16, 28, and 32 and the Siding Spring Survey (SSS) data for Nos. 34, 61, 118, and 123.

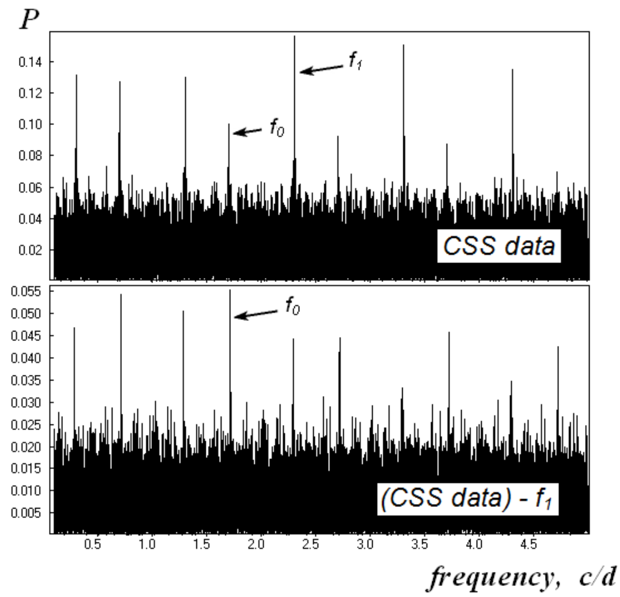

Figure 2.
The power spectra of USNO-B1.0 0865-0547700 (No. 101) for the frequencies f_1 and f_0.

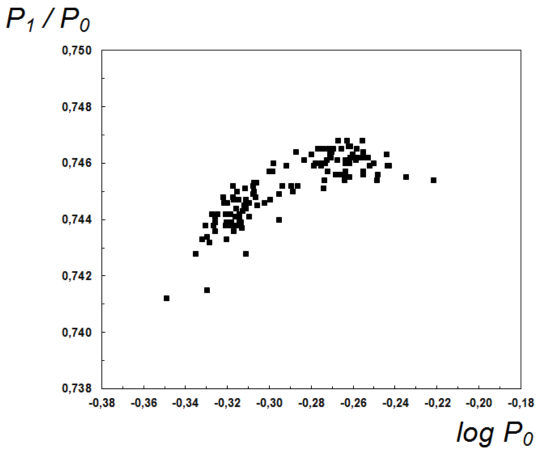

Figure 3.
The Petersen diagram for the program double-mode RR Lyrae stars.

Information on the studied stars is presented in Tables 1–3. Table 1 contains numbers from the USNO-B1.0 catalogs; equatorial coordinates (J2000); magnitude at maximum and minimum in the Catalina surveys photometric system; period previously known for the star, according to the Catalina surveys periodic variable star catalog.

Table 1. Positions, magnitudes, and CSS periods

No.	USNO-B1.0	Coordinates (J2000)	Magn.	P_{css}, days
1	0809-0000584	00 04 00.61 -09 03 52.4	18.1 – 19.0	0.228456
2	1214-0005810	00 20 37.88 +31 29 06.3	17.21 – 17.87	0.3993
3	1165-0007273	00 33 16.96 +26 31 23.8	16.88 – 17.54	0.4048828
4	1285-0024230	01 29 26.85 +38 33 37.6	16.84 – 17.69	0.3501596
5	0753-0017279	01 44 54.14 -14 36 43.1	16.65 – 17.52	0.2833071
6	1148-0022887	01 52 16.79 +24 48 30.9	18.2 – 18.8	0.409036
7	0855-0018783	01 59 03.12 -04 25 28.8	17.02 – 17.62	0.345979
8	1024-0026472	02 09 50.37 +12 26 35.7	16.72 – 17.41	0.3668101
9	1202-0027409	02 10 24.13 +30 13 35.9	17.45 – 18.20	0.4175119
10	1053-0034367	03 13 25.56 +15 21 47.1	16.80 – 17.35	0.3586323
11	0879-0086957	05 05 36.19 -02 03 18.3	15.99 – 16.49	0.3629001
12	1290-0175461	07 25 07.59 +39 03 40.5	18.1 – 18.8	0.4149317
13	1093-0149635	07 41 09.31 +19 19 29.5	17.30 – 17.93	0.411862
14	1275-0193982	07 54 12.87 +37 34 41.8	17.51 – 18.48	0.3556055
15	1206-0156310	07 57 01.52 +30 36 32.6	17.10 – 17.94	0.3586841
16	1113-0165279	08 01 22.22 +21 21 11.0	17.45 – 18.07	0.3547645
17	1220-0181065	08 04 46.10 +32 01 41.5	17.06 – 17.71	0.4035465
18	1239-0169052	08 08 46.89 +33 54 02.5	17.38 – 18.34	0.3573897
19	0851-0183152	08 36 57.74 -04 52 54.0	16.65 – 17.37	0.2579107
20	0849-0184619	08 39 39.34 -05 05 00.4	14.76 – 15.37	0.4066850
21	0950-0165712	08 40 25.71 +05 01 05.9	16.62 – 17.25	0.3947275
22	1333-0219575	08 56 43.10 +43 20 20.8	17.51 – 18.47	0.2718816
23	0949-0168449	09 00 52.18 +04 56 07.8	17.77 – 18.58	0.4169494
24	1085-0171850	09 02 22.30 +18 33 40.1	18.3 – 19.2	0.3593841
25	1231-0218418	09 50 42.03 +33 08 17.5	18.1 – 18.9	0.3678282
26	1354-0216351	10 02 59.61 +45 28 14.9	17.21 – 17.99	0.360449
27	1218-0193508	10 05 25.28 +31 49 17.2	17.70 – 18.56	0.4083289
28	0996-0203930	10 14 00.34 +09 39 23.9	18.38 – 18.96	0.400035
29	1186-0177860	10 20 40.27 +28 37 02.1	18.2 – 19.0	0.3629276
30	1353-0216977	10 22 11.43 +45 20 03.8	17.16 – 17.97	0.3852378
31	1206-0180778	10 25 06.21 +30 36 08.8	16.87 – 17.51	0.4264976
32	0998-0202183	10 26 43.71 +09 49 22.6	17.92 – 18.52	0.4192300
33	0773-0284953	10 29 16.53 -12 36 51.2	17.31 – 17.94	0.331676
34	0776-0280900	10 32 22.91 -12 19 45.6	16.70 – 17.43	0.3885005
35	1096-0184557	10 35 59.30 +19 38 35.2	17.03 – 17.95	0.3647451
36	1155-0178406	10 47 11.43 +25 33 02.1	18.3 – 19.1	0.3999900
37	1222-0240701	11 11 09.15 +32 15 58.7	17.54 – 18.31	0.4160121
38	0989-0211013	11 30 22.63 +08 54 43.1	17.56 – 18.33	0.3982128
39	1219-0215416	11 38 35.55 +31 57 35.7	16.56 – 17.30	0.3917887
40	1052-0209965	11 59 42.56 +15 15 30.2	17.7 – 18.5	0.4039638
41	1133-0205495	12 08 12.18 +23 21 43.2	17.64 – 18.55	0.4081016
42	1012-0201082	12 13 08.20 +11 16 58.9	17.8 – 18.6	0.3185300
43	1354-0233359	12 13 57.15 +45 28 57.2	16.53 – 17.15	0.3563433
44	1265-0198825	12 17 00.51 +36 33 17.0	16.93 – 17.68	0.41431

Table 1 (continued)

No.	USNO-B1.0	Coordinates (J2000)	Magn.	P_{css}, days
45	1357-0238053	12 17 13.19 +45 47 04.3	17.48 – 18.27	0.3925438
46	1186-0195874	12 18 03.35 +28 38 32.5	14.98 – 15.65	0.4056783
47	0779-0312304	12 22 07.88 -12 03 16.4	15.43 – 15.96	0.4014424
48	1121-0241173	12 24 48.76 +22 11 37.0	17.8 – 18.5	0.365138
49	1029-0248842	12 32 11.11 +12 55 57.4	17.8 – 18.6	0.3583015
50	0990-0218788	12 38 18.72 +09 04 39.9	17.9 – 18.8	0.36818
51	1056-0220051	12 48 42.70 +15 41 34.7	18.0 – 18.8	0.3575133
52	0914-0214548	12 51 12.45 +01 28 08.7	18.1 – 19.0	0.3555269
53	0780-0299594	12 57 52.69 -11 55 12.2	16.54 – 17.42	0.3681171
54	1296-0239320	13 01 37.09 +39 41 37.1	17.01 – 17.78	0.3962056
55	1078-0267601	13 02 12.76 +17 50 21.4	18.1 – 18.9	0.2622180
56	1079-0259243	13 03 44.72 +17 58 06.7	18.2 – 19.2	0.3610106
57	1004-0213772	13 05 12.71 +10 28 40.4	16.33 – 17.00	0.4028236
58	1271-0251785	13 12 59.88 +37 07 02.0	16.53 – 17.22	0.3830271
59	0930-0272057	13 16 31.48 +03 01 03.8	17.52 – 18.46	0.3852353
60	1079-0263747	13 23 23.78 +17 55 58.4	18.1 – 18.7	0.3636630
61	0734-0275609	13 24 55.11 -16 30 26.3	16.63 – 17.34	0.355069
62	1087-0215304	13 26 11.96 +18 44 44.5	17.7 – 18.6	0.3623650
63	0939-0220160	13 26 52.62 +03 54 45.9	18.4 – 19.4	0.3553628
64	0924-0299119	13 28 54.88 +02 26 13.7	18.1 – 19.1	0.3615783
65	1242-0208316	13 29 00.42 +34 12 42.7	17.32 – 18.04	0.3824442
66	0953-0222397	13 31 05.94 +05 23 08.1	18.3 – 19.3	0.3593364
67	0782-0288807	13 36 50.22 -11 43 41.9	15.31 – 15.87	0.4064343
68	1109-0222909	13 47 01.78 +20 56 59.1	18.4 – 19.3	0.3983011
69	0997-0244706	13 55 12.46 +09 46 09.7	18.2 – 19.2	0.3511642
70	0992-0233889	13 58 22.80 +09 13 28.5	18.6 – 19.3	0.4145404
71	1004-0225325	14 07 02.42 +10 26 24.5	18.0 – 18.8	0.3932995
72	0903-0233031	14 29 54.68 +00 18 23.4	17.86 – 18.72	0.25543
73	1079-0279998	14 31 50.38 +17 57 21.4	18.2 – 19.2	0.3768347
74	0921-0311410	14 33 52.88 +02 08 00.0	17.50 – 18.35	0.4074815
75	0910-0235484	14 34 33.44 +01 02 08.3	18.3 – 19.4	0.3613881
76	1171-0267245	14 34 54.04 +27 09 36.1	17.66 – 18.62	0.3670859
77	1154-0221420	14 58 11.76 +25 26 32.0	17.28 – 18.16	0.3596183
78	0856-0273425	15 42 01.65 -04 21 50.6	16.64 – 17.32	0.405829
79	1324-0325203	15 49 16.84 +42 24 24.3	16.31 – 16.86	0.408643
80	1195-0237751	15 49 51.12 +29 31 27.3	18.1 – 19.0	0.4019623
81	1199-0241646	16 05 31.22 +29 56 42.4	17.80 – 18.63	0.378708
82	1310-0265577	16 17 34.13 +41 03 41.8	16.48 – 17.16	0.3968672
83	0964-0266351	16 30 18.49 +06 26 26.5	16.34 – 16.96	0.4066873
84	1226-0325940	16 32 45.59 +32 40 51.2	16.50 – 17.08	0.4257980
85	1231-0287374	16 43 45.00 +33 06 50.8	17.47 – 18.26	0.4005932
86	1428-0330847	16 44 25.39 +52 51 45.8	17.48 – 18.21	0.4113088
87	1133-0257604	16 44 45.43 +23 21 31.7	17.8 – 18.8	0.347063
88	0947-0266120	16 48 22.86 +04 47 16.9	16.83 – 17.60	0.352471

Table 1 (continued).

No.	USNO-B1.0	Coordinates (J2000)	Magn.	P_{css}, days
89	1049-0266304	16 48 27.03 +14 54 07.7	17.03 – 17.85	0.351404
90	0975-0337130	16 48 44.15 +07 32 05.1	16.70 – 17.51	0.397585
91	1044-0285694	16 50 09.49 +14 28 19.9	17.78 – 18.67	0.395941
92	1104-0285077	16 57 57.12 +20 26 15.8	18.1 – 18.9	0.4110685
93	1395-0271240	17 03 41.28 +49 33 24.2	17.41 – 18.20	0.4145115
94	1420-0306066	17 03 58.58 +52 01 36.5	16.48 – 17.17	0.3809354
95	1423-0321174	17 10 02.88 +52 23 39.0	16.63 – 17.26	0.351166
96	1455-0262463	17 15 22.56 +55 33 27.8	17.9 – 18.8	0.3486949
97	1341-0303660	17 19 14.27 +44 06 49.1	17.02 – 17.61	0.356423
98	1438-0261177	17 19 26.73 +53 49 43.4	17.02 – 17.68	0.3609394
99	1353-0281207	17 30 10.80 +45 22 04.8	15.65 – 16.22	0.3751966
100	1290-0281948	17 51 38.64 +39 03 00.4	17.81 – 18.75	0.35726
101	0865-0547700	20 53 29.83 -03 25 47.3	13.66 – 14.14	0.434092
102	0864-0557130	20 55 53.78 -03 30 09.0	16.91 – 17.62	0.4205096
103	0822-0766869	20 58 49.72 -07 47 30.8	16.09 – 16.68	0.4473215
104	0827-0794782	21 01 26.74 -07 13 08.3	16.51 – 17.35	0.3634664
105	0880-0738036	21 05 16.47 -01 57 09.3	16.61 – 17.19	0.350679
106	0861-0556710	21 06 32.72 -03 49 02.1	16.94 – 17.78	0.3738126
107	0836-0634195	21 15 30.79 -06 22 58.9	15.21 – 15.76	0.4083559
108	0983-0652938	21 26 58.26 +08 23 43.9	16.47 – 17.09	0.3636620
109	0852-0588756	21 36 14.65 -04 44 59.2	13.68 – 14.19	0.4100153
110	0822-0785172	21 46 35.26 -07 45 16.0	17.73 – 18.45	0.4118734
111	1080-0684642	21 46 53.48 +18 02 34.1	16.58 – 17.19	0.4146242
112	1019-0699213	21 51 48.55 +11 55 41.8	18.0 – 18.9	0.3610020
113	0978-0738928	22 04 48.82 +07 52 28.4	17.3 – 18.1	0.3669817
114	1062-0607697	22 15 30.94 +16 13 16.2	17.27 – 18.15	0.3974137
115	0939-0601046	22 27 54.44 +03 59 20.7	17.51 – 18.34	0.3667860
116	1122-0653652	22 49 05.19 +22 15 55.0	17.12 – 17.86	0.4006000
117	1191-0584498	22 59 44.71 +29 08 36.4	16.43 – 17.15	0.3757060
118	0818-0752437	23 01 06.61 -08 06 03.1	15.76 – 16.36	0.4254757
119	1134-0563221	23 16 04.15 +23 28 42.9	17.64 – 18.47	0.347612
120	1022-0771774	23 19 03.43 +12 13 20.4	17.52 – 18.32	0.4099518
121	0842-0650428	23 20 20.40 -05 44 17.2	18.1 – 18.9	0.377461
122	1216-0595598	23 33 59.04 +31 38 12.3	16.98 – 17.85	0.3711300
123	0746-0838716	23 34 57.84 -15 19 00.6	16.32 – 16.98	0.358925

Light elements of all oscillations: the first-overtone period P_1, the fundamental period P_0, the first-overtone and fundamental mode epoch of maxima (expressed as JD – 2455000), period ratio P_1/P_0, periods of the frequencies $f_1 + f_0$ (P_{1+0}) and $f_1 - f_0$ (P_{1-0}) are collected in Table 2.

Table 2. Light elements

No.	P_1, d	P_0, d	Epoch_1	Epoch_0	P_1/P_0	P_{1+0}, d	P_{1-0}, d
1	0.421132	0.564845	0.060	0.070	0.7456	–	–
2	0.399297	0.534895	0.197	0.245	0.7465	–	–
3	0.404883	0.542396	0.105	0.353	0.7465	–	–
4	0.350161	0.470490	0.196	0.364	0.7442	–	–
5	0.395729	0.530534	0.400	0.490	0.7459	–	–
6	0.409031	0.547871	0.101	0.280	0.7466	–	–
7	0.345980	0.465495	0.060	0.296	0.7433	–	–
8	0.366813	0.492409	0.263	0.030	0.7449	–	–
9	0.417511	0.559708	0.444	0.444	0.7459	–	–
10	0.358635	0.481500	0.265	0.400	0.7448	–	–
11	0.362903	0.488575	0.225	0.300	0.7428	–	–
12	0.414933	0.555912	0.102	0.403	0.7464	–	–
13	0.411855	0.551687	0.118	0.050	0.7465	–	–
14	0.355599	0.477799	0.257	0.350	0.7442	0.2038714	–
15	0.358685	0.481358	0.074	0.305	0.7452	0.205531	–
16	0.354760	0.476318	0.312	0.102	0.7448	0.2033256	–
17	0.403540	0.540394	0.222	0.254	0.7468	–	1.5937
18	0.357387	0.480261	0.052	0.250	0.7442	–	–
19	0.347875	0.467934	0.192	0.015	0.7434	–	–
20	0.406688	0.545078	0.325	0.523	0.7461	0.2329125	1.60176
21	0.394727	0.528738	0.047	0.165	0.7465	0.226001	–
22	0.373419	0.501434	0.050	0.231	0.7447	0.2140286	–
23	0.416958	0.558754	0.225	0.030	0.7462	–	–
24	0.359383	0.483002	0.359	0.082	0.7441	–	–
25	0.367834	0.493881	0.317	0.014	0.7448	0.2108182	–
26	0.360447	0.483830	0.128	0.200	0.7450	–	–
27	0.408334	0.547379	0.333	0.072	0.7460	0.233868	–
28	0.400034	0.536083	0.120	0.203	0.7462	–	–
29	0.362927	0.487467	0.205	0.420	0.7445	–	–
30	0.385235	0.516157	0.341	0.333	0.7464	–	–
31	0.426495	0.571772	0.210	0.135	0.7459	–	–
32	0.419233	0.561943	0.160	0.477	0.7460	0.240104	–
33	0.331673	0.447456	0.300	0.029	0.7412	–	–
34	0.388498	0.520738	0.045	0.005	0.7461	0.222501	–
35	0.364742	0.490181	0.154	0.110	0.7441	–	–
36	0.399983	0.535953	0.168	0.450	0.7463	–	–
37	0.416018	0.557528	0.195	0.166	0.7462	0.2380872	–
38	0.398213	0.533747	0.354	0.500	0.7461	0.228063	–
39	0.391787	0.524939	0.280	0.425	0.7463	–	–
40	0.403965	0.541781	0.153	0.313	0.7456	–	–
41	0.408103	0.547401	0.133	0.016	0.7455	0.2338005	–
42	0.347029	0.468035	0.080	0.470	0.7415	–	–
43	0.356342	0.478824	0.207	0.027	0.7442	–	–
44	0.414322	0.555276	0.320	0.325	0.7462	–	–

Table 2 (continued)

No.	P_1, d	P_0, d	Epoch$_1$	Epoch$_0$	P_1/P_0	P_{1+0}, d	P_{1-0}, d
45	0.392543	0.526289	0.255	0.017	0.7459	–	–
46	0.405674	0.544233	0.195	0.470	0.7454	–	–
47	0.401446	0.537739	0.184	0.130	0.7465	–	–
48	0.365136	0.490349	0.158	0.188	0.7446	–	–
49	0.358300	0.481836	0.226	0.487	0.7436	0.205498	–
50	0.368182	0.494004	0.016	0.165	0.7453	–	–
51	0.357511	0.480562	0.065	0.196	0.7439	0.2050006	–
52	0.355529	0.478307	0.310	0.246	0.7433	–	–
53	0.368106	0.494463	0.125	0.115	0.7445	–	–
54	0.396204	0.531760	0.063	0.190	0.7451	0.2270427	–
55	0.355745	0.478242	0.342	0.088	0.7439	–	–
56	0.361005	0.485204	0.295	0.265	0.7440	–	–
57	0.402831	0.539888	0.323	0.216	0.7461	–	–
58	0.383030	0.514168	0.235	0.485	0.7450	–	–
59	0.385226	0.516959	0.050	0.123	0.7452	–	–
60	0.363665	0.488314	0.317	0.025	0.7447	–	–
61	0.355069	0.476846	0.120	0.202	0.7446	–	–
62	0.362379	0.486854	0.132	0.270	0.7443	–	–
63	0.355362	0.477771	0.302	0.476	0.7438	–	–
64	0.361582	0.486191	0.355	0.436	0.7437	0.2073618	–
65	0.382442	0.513224	0.138	0.180	0.7452	–	–
66	0.359335	0.483093	0.292	0.470	0.7438	–	–
67	0.406438	0.545077	0.235	0.177	0.7457	0.232831	1.59786
68	0.398304	0.534137	0.062	0.200	0.7457	–	–
69	0.351159	0.472061	0.227	0.370	0.7439	–	–
70	0.414543	0.555941	0.242	0.127	0.7457	–	–
71	0.393298	0.527220	0.240	0.025	0.7460	–	–
72	0.343379	0.462283	0.207	0.077	0.7428	0.1970256	1.33507
73	0.376845	0.506502	0.193	0.190	0.7440	0.216076	–
74	0.407487	0.545647	0.221	0.195	0.7468	–	–
75	0.361391	0.485785	0.330	0.183	0.7439	–	–
76	0.367091	0.492554	0.130	0.415	0.7453	–	–
77	0.359613	0.483115	0.080	0.090	0.7444	–	–
78	0.405830	0.544401	0.219	0.153	0.7455	0.232506	1.59430
79	0.408647	0.547662	0.108	0.313	0.7462	0.234027	–
80	0.401963	0.539078	0.400	0.297	0.7456	–	–
81	0.378704	0.508196	0.079	0.006	0.7452	–	–
82	0.396868	0.531662	0.132	0.515	0.7465	–	1.56567
83	0.406697	0.545187	0.020	0.380	0.7460	–	–
84	0.425795	0.570831	0.080	0.310	0.7459	–	–
85	0.400587	0.536720	0.127	0.402	0.7464	–	–
86	0.411312	0.551274	0.118	0.305	0.7461	–	–
87	0.396789	0.532323	0.322	0.480	0.7454	0.227335	1.55855
88	0.352468	0.473596	0.110	0.216	0.7442	0.202078	–

Table 2 (continued)

No.	P_1, d	P_0, d	Epoch$_1$	Epoch$_0$	P_1/P_0	P_{1+0}, d	P_{1-0}, d
89	0.351397	0.472265	0.410	0.324	0.7441	0.2014824	–
90	0.397578	0.532921	0.068	0.340	0.7460	–	–
91	0.395935	0.530745	0.276	0.100	0.7460	0.226767	–
92	0.411062	0.550905	0.257	0.327	0.7462	–	–
93	0.414512	0.555957	0.088	0.044	0.7456	–	–
94	0.380940	0.510745	0.017	0.080	0.7459	–	–
95	0.351166	0.472239	0.027	0.330	0.7436	–	–
96	0.348685	0.469194	0.243	0.105	0.7432	–	–
97	0.356425	0.478660	0.122	0.333	0.7446	–	–
98	0.360933	0.484660	0.233	0.122	0.7447	–	–
99	0.375194	0.503175	0.355	0.343	0.7457	0.2149306	–
100	0.357262	0.480341	0.245	0.003	0.7438	–	–
101	0.434091	0.582264	0.360	0.533	0.7455	0.2486906	–
102	0.420501	0.564100	0.295	0.560	0.7454	–	–
103	0.447354	0.600176	0.250	0.530	0.7454	0.256312	1.75698
104	0.363472	0.488297	0.143	0.258	0.7444	0.2083694	1.42181
105	0.350681	0.471482	0.253	0.182	0.7438	–	–
106	0.373810	0.501303	0.037	0.115	0.7457	0.214134	1.46993
107	0.408357	0.546980	0.340	0.076	0.7466	–	–
108	0.363663	0.488102	0.275	0.080	0.7451	–	–
109	0.410019	0.549393	0.324	0.095	0.7463	0.2347898	1.61628
110	0.411877	0.551978	0.085	0.236	0.7462	–	–
111	0.414626	0.555216	0.163	0.555	0.7468	–	–
112	0.361007	0.485087	0.074	0.372	0.7442	–	–
113	0.366981	0.492575	0.316	0.103	0.7450	–	–
114	0.397409	0.532732	0.060	0.275	0.7460	–	–
115	0.366788	0.492187	0.056	0.096	0.7452	–	–
116	0.400595	0.536693	0.140	0.147	0.7464	–	–
117	0.375699	0.503623	0.258	0.263	0.7460	–	–
118	0.425484	0.570136	0.174	0.215	0.7463	–	–
119	0.347608	0.467317	0.133	0.180	0.7438	0.199336	–
120	0.409944	0.549317	0.104	0.120	0.7463	–	–
121	0.377479	0.506748	0.301	0.367	0.7449	–	–
122	0.371137	0.498405	0.086	0.310	0.7446	–	–
123	0.358927	0.482006	0.306	0.045	0.7447	–	–

Table 3 presents semi-amplitudes of all the oscillations in Catalina surveys data: semi-amplitudes of first-overtone (A_1) and fundamental mode (A_0) oscillations, for the $f_1 + f_0$ (A_{1+0}) and $f_1 - f_0$ (A_{1-0}) frequencies; asterisks mark the presence of comments to Tables 1–3.

Table 3. Semi-amplitudes

No.	A_1	A_0	A_{1+0}	A_{1-0}	Comm	No.	A_1	A_0	A_{1+0}	A_{1-0}	Comm
1	0.135	0.096	–	–	–	45	0.124	0.093	–	–	–
2	0.163	0.054	–	–	–	46	0.155	0.063	–	–	–
3	0.161	0.065	–	–	–	47	0.167	0.040	–	–	–
4	0.161	0.065	–	–	–	48	0.159	0.071	–	–	–
5	0.159	0.074	–	–	–	49	0.130	0.100	0.048	–	–
6	0.142	0.070	–	–	–	50	0.184	0.076	–	–	–
7	0.157	0.037	–	–	–	51	0.152	0.094	0.069	–	–
8	0.147	0.083	–	–	*	52	0.171	0.128	–	–	–
9	0.148	0.059	–	–	–	53	0.150	0.125	–	–	–
10	0.146	0.040	–	–	*	54	0.153	0.100	0.050	–	–
11	0.143	0.045	–	–	–	55	0.123	0.116	–	–	–
12	0.133	0.068	–	–	–	56	0.164	0.100	–	–	–
13	0.163	0.076	–	–	*	57	0.147	0.048	–	–	–
14	0.142	0.108	0.059	–	–	58	0.136	0.095	–	–	–
15	0.158	0.051	0.034	–	–	59	0.174	0.099	–	–	–
16	0.157	0.067	0.035	–	*	60	0.132	0.082	–	–	–
17	0.153	0.047	–	0.026	–	61	0.162	0.081	–	–	–
18	0.159	0.082	–	–	–	62	0.160	0.133	–	–	–
19	0.152	0.107	–	–	–	63	0.173	0.115	–	–	–
20	0.150	0.057	0.023	0.035	–	64	0.162	0.140	0.069	–	–
21	0.162	0.062	0.026	–	–	65	0.196	0.084	–	–	–
22	0.153	0.150	0.053	–	–	66	0.201	0.101	–	–	*
23	0.163	0.075	–	–	–	67	0.125	0.070	0.032	0.047	–
24	0.135	0.074	–	–	–	68	0.146	0.062	–	–	–
25	0.163	0.094	0.044	–	–	69	0.200	0.196	–	–	–
26	0.144	0.045	–	–	–	70	0.167	0.101	–	–	–
27	0.154	0.088	0.050	–	–	71	0.162	0.080	–	–	–
28	0.153	0.058	–	–	*	72	0.116	0.105	0.064	0.038	–
29	0.164	0.082	–	–	–	73	0.150	0.119	0.064	–	–
30	0.160	0.056	–	–	–	74	0.171	0.053	–	–	–
31	0.151	0.032	–	–	–	75	0.158	0.137	–	–	*
32	0.130	0.068	0.045	–	*	76	0.175	0.063	–	–	–
33	0.155	0.059	–	–	–	77	0.157	0.108	–	–	–
34	0.146	0.058	0.041	–	–	78	0.134	0.061	0.026	0.026	–
35	0.169	0.102	–	–	*	79	0.133	0.047	0.033	–	–
36	0.162	0.076	–	–	–	80	0.164	0.061	–	–	–
37	0.134	0.057	0.032	–	*	81	0.161	0.086	–	–	–
38	0.143	0.054	0.047	–	–	82	0.147	0.042	–	0.028	–
39	0.153	0.059	–	–	–	83	0.150	0.049	–	–	–
40	0.165	0.080	–	–	–	84	0.164	0.035	–	–	–
41	0.168	0.076	0.040	–	–	85	0.155	0.079	–	–	–
42	0.120	0.122	–	–	–	86	0.157	0.080	–	–	–
43	0.116	0.074	–	–	–	87	0.152	0.115	0.054	0.045	–
44	0.162	0.070	–	–	–	88	0.163	0.055	0.047	–	–

Table 3 (continued)

No.	A_1	A_0	A_{1+0}	A_{1-0}	Comm	No.	A_1	A_0	A_{1+0}	A_{1-0}	Comm
89	0.133	0.074	0.045	–	–	107	0.160	0.032	–	–	–
90	0.164	0.077	–	–	–	108	0.162	0.045	–	–	–
91	0.149	0.071	0.051	–	–	109	0.166	0.040	0.024	0.039	*
92	0.142	0.077	–	–	–	110	0.152	0.087	–	–	–
93	0.149	0.076	–	–	–	111	0.179	0.049	–	–	–
94	0.168	0.077	–	–	–	112	0.153	0.086	–	–	*
95	0.145	0.065	–	–	–	113	0.173	0.077	–	–	–
96	0.178	0.135	–	–	–	114	0.170	0.065	–	–	*
97	0.170	0.048	–	–	–	115	0.158	0.056	–	–	–
98	0.159	0.062	–	–	–	116	0.175	0.059	–	–	–
99	0.162	0.061	0.032	–	–	117	0.169	0.066	–	–	–
100	0.147	0.091	–	–	–	118	0.138	0.052	–	–	–
101	0.137	0.054	0.024	–	*	119	0.141	0.080	0.054	–	–
102	0.125	0.078	–	–	–	120	0.141	0.063	–	–	–
103	0.134	0.072	0.031	0.031	–	121	0.171	0.109	–	–	–
104	0.148	0.112	0.055	0.037	–	122	0.167	0.101	–	–	–
105	0.153	0.044	–	–	–	123	0.154	0.061	–	–	–
106	0.154	0.067	0.028	0.024	–	–	–	–	–	–	–

Comments:

8. MLS magnitudes are given in Table 1. From CSS data, $16^{\mathrm{m}}.67 - 17^{\mathrm{m}}.32$, $A_1 = 0.132$, $A_0 = 0.076$.

10. MLS magnitudes are given in Table 1. The CSS data are for combined brightness of two stars, USNO-B1.0 1053-0034367 and USNO-B1.0 1053-0034364, $d = 6''.0$; the pair is unresolved, and the measured amplitudes are strongly underestimated. In the MLS data, the pair is resolved: MLSJ031325.6+152146 = USNO-B1.0 1053-0034367 varies, while MLSJ031325.3+152142 = USNO-B1.0 1053-0034364 is a constant star.

13. MLS magnitudes are given in Table 1. MLS data are in the JD 2454096–2456666 time range. The brightness level is higher in the CSS data, possibly because of a faint companion, so the CSS amplitudes can be somewhat underestimated.

16. MLS magnitudes are given in Table 1. From CSS data, $17^{\mathrm{m}}.34 - 18^{\mathrm{m}}.10$, $A_1 = 0.142$, $A_0 = 0.055$.

28. MLS magnitudes are given in Table 1. From CSS data, $18^{\mathrm{m}}.2 - 19^{\mathrm{m}}.1$, $A_1 = 0.173$, $A_0 = 0.078$.

32. MLS magnitudes are given in Table 1. From CSS data, $17^{\mathrm{m}}.8 - 18^{\mathrm{m}}.6$, $A_1 = 0.138$, $A_0 = 0.066$, $A_{1+0} = 0.066$.

35. Additional non-radial pulsation with the light elements: $HJD(\max) = 2455000.093 + 0.359842 \times E$, $A_N = 0.054$.

37. Additional non-radial pulsation with the light elements: $HJD(\max) = 2455000.433 + 0.433241 \times E$, $A_N = 0.046$.

66. Also detected is the interaction frequency $2f_1$: $P_{2\times1} = 0.1796499$ days, $A_{2\times1} = 0.069$.

75. The known RRAB star CSSJ143432.6+010218 = USNO-B1.0 0910-0235475 is in $d = 15''.5$ to the north–west.

101. GSC 5183–01440.

109. GSC 5216–00603.

112. An additional non-radial pulsation is possible, with the light elements: $HJD(max) = 2455000.275 + 0.311250 \times E$, $A_N = 0.055$.

114. There are two objects with identical coordinates in the Catalina Surveys Periodic Variable Star Catalog (Drake et al. 2014); the period of the second of them is given as 0.3974071 days.

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