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THE VARIABILITY OF HD 224 559

HD 224 559 = HR 9070 = LQ And is classified as a B3 IV star of Beta Cep type (Borgman, 1960). Provin (1953) used it as a check star for HD 224 801. Percy (1979) and Percy et al. (1981) observed HD 224 559 on nine nights altogether. They found short time-scale light variations for all single runs with amplitudes of 0.01 to 0.06 mag. The periodogram analysis shows possible time scales of 0.20 to 0.29 day with an average value of $P = 0.238 \pm 0.003$ day.

During 1978 we used this object as a second comparison star for the investigation of the Ap star HD 224 801. The observations were carried out with our twin telescope stationed at the observatory Shemakha of the Aserbaidschanian Academy of Sciences (Hildebrandt et al., 1985). During the search for short time light variations of HD 224 801 we also obtained five measurement series (HD 3 - HD 224 559) in the U, B, V region. The observations (Table I) were subjected to a frequency analysis using Deeming's (1975) method within the interval of periods 0.15 - 0.4 day. In all three spectral regions (U, B, V) we were able to localize two periods at the same point of the power spectrum. The best fit of the theoretical curve to the observations was realized by formula (1) when the two periods determined and their first overtones were used.

$$\Delta m(t) = A + \sum_{k=1}^2 \sum_{j=1}^2 (B_{kj} \cdot \sin(k \cdot 2 \cdot \pi \cdot \nu(j)t) + C_{kj} \cdot \cos(k \cdot 2 \cdot \pi \cdot \nu(j)t)) \quad (1)$$

The results of the calculations for the V spectral region are summarized in Table II. For this region we obtained the smallest error for the theoretical curve.

The five measurement series for the V spectral region are shown in Figure 1. The full line is the theoretical curve of the light variations of this star. Time is given in minutes of Julian day, the latter being written at the top of each figure. These results are in agreement with those of Percy.

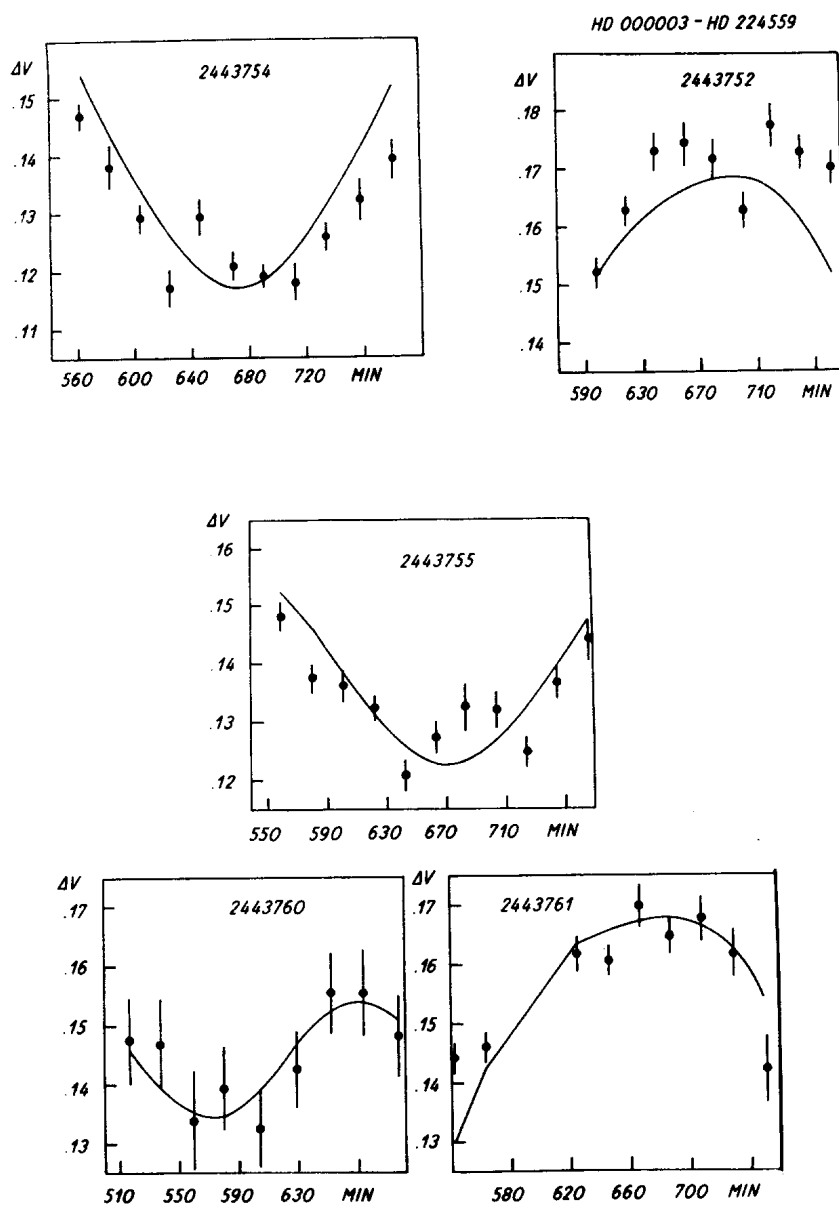


Figure 1. Short time light variations of HD 224 559

Table I. Measurement series (HD 3 - HD 224 559)

Julian Date	ΔV	$\Delta\Delta V$	ΔB	$\Delta\Delta B$	ΔU	$\Delta\Delta U$
43752.4151	0.1522	0.0027	0.3205	0.0030	1.0421	0.0030
43752.4301	0.1627	0.0027	0.3240	0.0029	1.0407	0.0039
43752.4436	0.1730	0.0033	0.3420	0.0034	1.0528	0.0043
43752.4580	0.1744	0.0038	0.3401	0.0026	1.0500	0.0040
43752.4722	0.1717	0.0033	0.3341	0.0025	1.0475	0.0039
43752.4869	0.1628	0.0031	0.3278	0.0036	1.0387	0.0039
43752.5008	0.1774	0.0037	0.3410	0.0036	1.0607	0.0034
43752.5149	0.1727	0.0030	0.3360	0.0035	1.0484	0.0036
43752.5300	0.1701	0.0029	0.3331	0.0026	1.0447	0.0035
43754.3903	0.1468	0.0023	0.3090	0.0031	1.0230	0.0034
43754.4048	0.1381	0.0038	0.3027	0.0035	1.0134	0.0034
43754.4194	0.1292	0.0025	0.2911	0.0023	0.9996	0.0039
43754.4336	0.1172	0.0031	0.2831	0.0030	0.9942	0.0039
43754.4484	0.1294	0.0031	0.2928	0.0032	1.0061	0.0031
43754.4646	0.1209	0.0024	0.2862	0.0029	1.0026	0.0029
43754.4794	0.1191	0.0020	0.2858	0.0025	0.9957	0.0036
43754.4941	0.1180	0.0030	0.2850	0.0025	0.9927	0.0026
43754.5098	0.1258	0.0024	0.2889	0.0030	1.0015	0.0035
43754.5261	0.1321	0.0035	0.2912	0.0037	0.9992	0.0034
43754.5425	0.1389	0.0033	0.2985	0.0034	1.0128	0.0027
43755.3885	0.1481	0.0027	0.3104	0.0024	1.0181	0.0029
43755.4028	0.1375	0.0025	0.2971	0.0020	1.0169	0.0033
43755.4176	0.1362	0.0028	0.2939	0.0026	1.0042	0.0027
43755.4320	0.1324	0.0022	0.2929	0.0024	1.0106	0.0032
43755.4461	0.1208	0.0027	0.2904	0.0029	1.0035	0.0029
43755.4604	0.1273	0.0026	0.2915	0.0021	1.0035	0.0022
43755.4743	0.1324	0.0041	0.2943	0.0032	1.0076	0.0037
43755.4886	0.1319	0.0031	0.2942	0.0030	1.0108	0.0031
43755.5025	0.1247	0.0025	0.2946	0.0030	1.0073	0.0021
43755.5176	0.1365	0.0028	0.3030	0.0022	1.0101	0.0026
43755.5324	0.1439	0.0035	0.3086	0.0025	1.0180	0.0030
43760.3588	0.1475	0.0072	0.3156	0.0063	1.0301	0.0079
43760.3739	0.1470	0.0077	0.3116	0.0064	1.0278	0.0076
43760.3886	0.1339	0.0083	0.2997	0.0065	1.0193	0.0073
43760.4028	0.1394	0.0070	0.3036	0.0069	1.0271	0.0071
43760.4191	0.1326	0.0064	0.3073	0.0067	1.0217	0.0081
43760.4368	0.1426	0.0065	0.3076	0.0059	1.0218	0.0075
43760.4525	0.1555	0.0069	0.3202	0.0065	1.0375	0.0076
43760.4682	0.1555	0.0073	0.3243	0.0058	1.0365	0.0077
43760.4843	0.1482	0.0069	0.3205	0.0066	1.0332	0.0077
43761.3763	0.1443	0.0026	0.3128	0.0024	1.0295	0.0029
43761.3911	0.1461	0.0027	0.3164	0.0029	1.0210	0.0039
43761.4340	0.1618	0.0029	0.3269	0.0029	1.0430	0.0029
43761.4484	0.1605	0.0024	0.3287	0.0022	1.0482	0.0034
43761.4631	0.1698	0.0035	0.3335	0.0040	1.0404	0.0032
43761.4774	0.1647	0.0029	0.3405	0.0029	1.0450	0.0038
43761.4915	0.1676	0.0038	0.3348	0.0028	1.0391	0.0030
43761.5060	0.1617	0.0039	0.3248	0.0028	1.0292	0.0037
43761.5207	0.1422	0.0056	0.3114	0.0041	1.0166	0.0033

Table II. Results of calculations for the V spectral region

P [d]	Amplitude (V) [mag] fundamental period	Amplitude (V) [mag] first overtone
0.2365	0.033	0.006
0.2647	0.028	0.010

The scatter of the period and the amplitude found by him can be interpreted as a beat effect resulting from the two periods. No significant colour variation in (B-V) and (U-B) was found. The ratio of the above periods $P_1/P_2 = 0.89$ points to a non-radial pulsation but this needs confirmation by further observations.

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