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SHORTER SECONDARY VARIATION OF RS BOOTIS

The secondary light variability of 537^d of the RR Lyrae star RS Bootis has been ascertained by P.Th. Oosterhoff in Leiden from his great number of light curves photographically observed between 1938 and 1944. He already suspects that the assumed sine-curve of the secondary period exhibits a "minor variation" since this was larger than the estimated observational errors.

Investigations on RS Boo were undertaken at Konkoly Observatory in an attempt to verify this minor variation of the secondary period. The observations were carried out systematically on 45 nights between 1971 and 1979 with a 60 cm telescope in UVB photoelectric photometry. The data obtained were transformed to the international UVB system. The comparison star was BD +32°2486.

The difficulty in determining the shorter period or cycle is due to the smallness in amplitude variations during the suspected cycle. The shorter regular variations are concealed particularly because of the rapid variations of the increasing and decreasing branches of the longer cycle. Fortunately, the shorter variations of the light amplitude, of the O-C curve and of the slopiness of the ascending branch of the fundamental period are more significant and synchronous in the relatively still phases of minima and maxima of the longer cycle. In view of this, our investigations were limited to the above phases of longer cycle.

The data of the above mentioned parameters are given in Table I and are shown in Figure 1; these data derive from the observations carried out by us between 1975 and 1979 and by Oosterhoff in 1942.

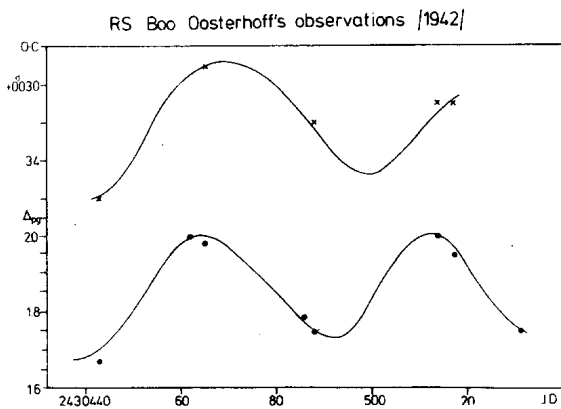
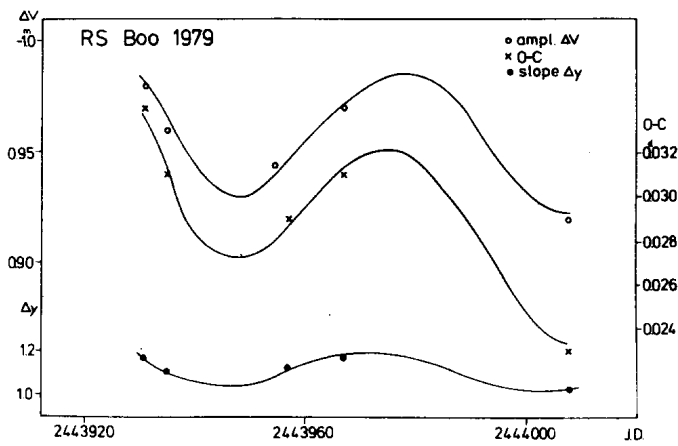
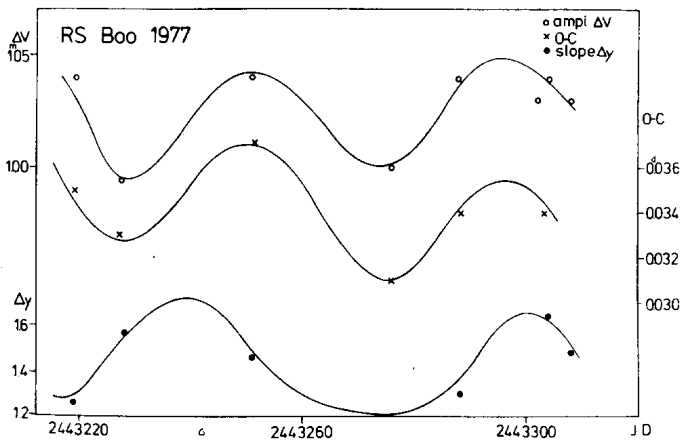


Fig. 1

We have derived new elements of the longer cycle, viz.

$$\text{Lowest maximum: } 2442500 + 533^{\text{d}}$$

For the shorter cycles we found an average length of 62^{d} from our own observations and 58^{d} from Oosterhoff's observations; these are shown in Figure 2.

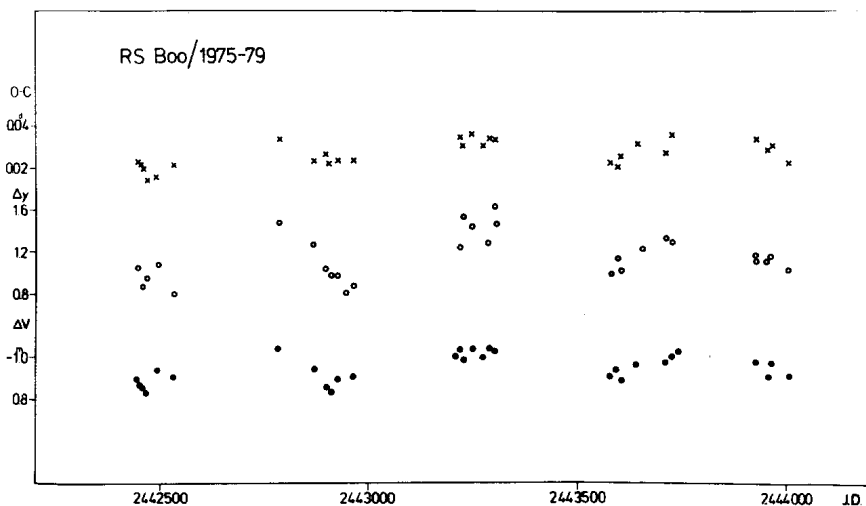


Fig. 2

The amplitudes of the shorter cycles in any parameter are smaller than the amplitudes of the longer ones, respectively. Nevertheless the amplitudes of the shorter variation are much higher than the errors of the observational values. At the same time, the amplitudes of the shorter cycles change during the longer cycle. Their highest values are to be found in the maxima of the longer cycles.

Our results do not give evidence for definite periodicity of any cycle. Consequently, the occurrence of the Blashko effect is not certain.

A physical interpretation of the two different long cycles of RS Boo and the relationship between them is not manifested but the multivarying behaviour of this star may be connected with the uncertainty regarding its classification since RS Boo belongs to RR_c according to its period and to RR_a according to the shape of its light curve.

On the other hand, its fundamental period suggests that RS Boo

Table I

Parameters of RS Bootis			
J.D. (day)	Amplitude ΔV (m)	O-C (day)	Slopiness Δy
2442443	-0.90	0.024	1.06
449	0.87	0.023	-
454	0.86	0.021	0.88
465	0.83	0.015	0.95
493	0.94	0.017	1.09
532	0.91	0.022	0.80
786	1.04	1.034	1.49
870	0.95	0.028	1.24
899	0.87	0.027	1.06
905	0.87	0.023	1.03
910	0.84	0.022	0.99
927	0.90	0.024	0.99
947	-	-	0.82
964	0.91	0.024	0.89
2443219	1.04	0.035	1.26
227	0.99	0.031	-
228	1.00	0.034	1.56
251	1.04	0.037	1.46
276	1.00	0.031	-
288	-1.04	0.034	1.30

J.D. (day)	Amplitude ΔV (m)	O-C (day)	Slopiness Δy
2443298	-1.08	-	-
302	1.03	0.034	-
304	1.04	0.034	1.64
308	1.03	0.037	1.48
580	0.91	0.023	-
583	0.90	0.022	1.00
597	0.94	0.021	1.21
599	0.89	0.020	1.15
608	0.89	0.026	1.03
645	0.97	0.032	-
659	-	-	1.24
716	0.98	0.027	1.34
727	1.00	0.035	1.16
730	0.97	0.036	1.29
744	1.02	0.035	-
931	0.98	0.034	1.17
935	0.96	0.031	1.11
957	0.91	0.029	1.13
967	0.97	0.031	1.17
2444008	-0.91	0.023	1.03

Oosterhoff's observations

J.D.	O-C	Slopiness (Δ_{pg})
2430443	0.036	1.67
462	-	2.00
465	0.029	1.98
486	-	1.79
488	0.032	1.75
514	0.031	2.00
517	0.031	1.95
531	-	1.75

is a close relative of the dwarf Cepheids which are strongly inclined to have multivariation.

The observational data and a detailed analysis of RS Boo will be published elsewhere.

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References:

- Campbell, Harv. Ann. 63, 168
 Oosterhoff, P.Th., Bull. Astr. Neth. 369, 10