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PHOTOMETRIC PERIOD OF THE SUSPECTED DELTA SCUTI-TYPE STAR IOTA BOOTIS

Iota Boo (= 21 Boo = NSV 06610 = HR 5350) is a suspected low-amplitude DSCTC-type variable according to Kukarkin et al. (1982) and Kholopov et al. (1985). In spite of the photometric variability reported by Albert (1980) this star was used several times as a photometric standard (e.g. Glushneva, 1992), but it was neglected as far as the study of its light changes is concerned. Albert's result was more or less confirmed by Szatmáry (1988) but no other analysis of the light curve has been published yet. We note that some references for this star given e.g. in the SIMBAD database correspond to 44i Boo, a bright W UMa-type eclipsing binary, instead of Iota Boo.

We carried out photoelectric photometry (in Johnson-system using B and V filters) of Iota Bootis on three nights: 29 June, 8 and 9 July, 1993 with the 40 and 50 cm Cassegrain telescope of Szeged Observatory and Konkoly Observatory, respectively. The comparison and check stars were Theta Boo (HR 5404) and HR 5360, respectively. There were simultaneous observations on the last night at the two observing sites located in 200 km distance from each other. The aim of this short campaign was to separate the light variation of Iota Boo from the atmospheric effects and re-check the photometric period(s) found by Albert (1980) and Szatmáry (1988). Unfortunately, the light curves obtained have only limited accuracy (0.02-0.03 mag) due to instrumental problems and weather conditions, therefore these curves are mainly dominated by observational noise. However, the multi-site observations enabled us to filter out the noise and detect a frequency component which is very probably due to rapid oscillation of Iota Boo. We used the raw (variable star minus sky) data for period analysis.

The method used for noise-filtering has been known in data processing for a long time and based on the following: if we compute Fourier spectra of different light curves of a variable star and then superimpose, the amplitude of the noise decreases relative to the amplitude of the real oscillation, because the peaks caused by the noise are not exactly at the same position in the different spectra, in contrast with the oscillation peak. In other words, we can "average out" the noise relative to the signal. It is important to note that the signal-to-noise ratio cannot be increased and the amplitude of the oscillation, of course, cannot be determined properly by this method.

The sum of the spectra is plotted in Figure 1 (based on both V and B data because the position of the oscillation peak does not depend on the wavelength). As it can be seen, there is a peak at 35.6 c/d (about 40 min period) in the summed spectrum of Iota Boo which is in good agreement with the results of previous studies. Meanwhile, the composite spectra of the comparison stars do not show peak at the given frequency interval. Therefore we conclude that Iota Boo definitely shows low-amplitude oscillation with the period mentioned above. The amplitude of the oscillation is close to the errors of our measurements, and probably does not exceed 0.05 mag. This means that the variation and the presumable type of Iota Boo (DSCTC) is also confirmed.

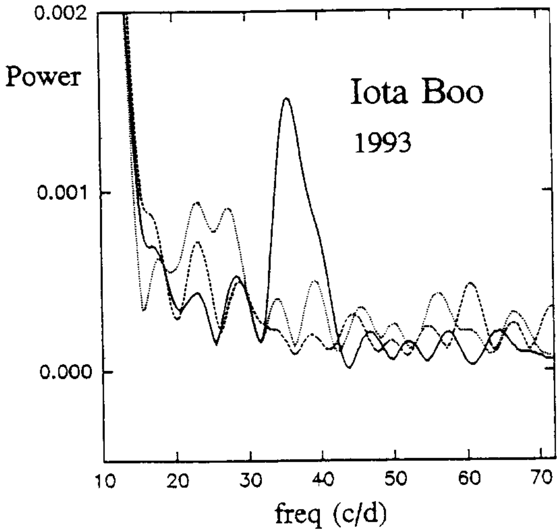

Figure 1. Sum of the spectra. The continuous line represents the spectrum of Iota Boo, while the dashed and dotted lines show the spectrum of comparison and check star, respectively.

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