THE LIGHT VARIABILITY OF BD + 25°2511*

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(Received 12 July, 1983)

Abstract. Photometry of the spectroscopic binary BD + 25°2511 obtained during the 1981, 1982, and 1983 observing seasons shows that it is a variable with a period of about 3.5 days.

BD + 25°2511 is a spectroscopic binary with double Ca II H and K emissions, and it is most likely a member of the Coma Berenices cluster (Wilson, 1963; Trumpler, 1938). Both Wilson (1963) and Trumpler (1938) assign BD + 25°2511 a spectral type close to dG8. Photometry of this object was begun in 1981 as part of a programme on late-type emission binaries to study their photometric behaviour and chromospheric activity.

Observations were made with the 34-cm Cassegrain reflector of the Kavalur Observatory through standard B and V filters. All the measurements were made with respect to the near by comparison star HD 108 806. As a check on the photometric constancy of this comparison, HD 108576 was also observed on several nights. Table I gives the Julian day intervals covered by the observations (ΔT), the number of nights observed during each interval (n) and the corresponding total range in the observed visual magnitudes (Δv). It is clear from the Table I that BD + 25°2511 is a variable and thus confirms its suspected light variability reported by Eggen (1978).

In order to determine the period of light variation, the period finding technique as outlined in Raveendran *et al.* (1982) was employed. All the three data sets were independently subjected to a period analysis. The 1981 observations yielded a 3.540 days period, while the period given by the 1982 data is 3.475 days. Since the two sets of observations cover only a few photometric cycles, the period determinations

TABLE I
Total range in the observed visual magnitudes and the derived periods

Year	ΔT	n	Δv	Period (day)
1981	2 444 617–4678	22	0.08	3.540
1982	2 444 984–5026	24	0.11	3.475
1983	2 445 366–5412	14	0.02	–

* Paper presented at the Lembang-Bamberg IAU Colloquium No. 80 on 'Double Stars: Physical Properties and Generic Relations', held at Bandung, Indonesia, 3–7 June, 1983.

Astrophysics and Space Science **99** (1984) 171–173. 0004–640X/84/0991–0171$00.45.

are not sufficiently accurate to decide definitely whether the difference in the derived periods is real. The 1983 observations did not yield any satisfactory period. We attribute this to the small range in the observed visual magnitudes, which is comparable to the uncertainty ($\sim$ 0.01 mag) in the measurements.

The Julian days of observation were converted to photometric phases by use of the following equations:

(1) Phase = JD 2 444 617.494 + $3^d.540E$, for the 1981 data, and

(2) Phase = JD 2444 984.474 + $3^d.475E$, for the 1982 data.

The initial epoch in each case corresponds to the time of the first observation. In Figure 1, the differential magnitudes (in the sense, BD+25°2511–HD 108 806) obtained during the 1981 and 1982 observing seasons are plotted separately. Each point is a mean of 3–4 independant measurements. It is clearly seen that the light curves are nearly sinusoidal and the amplitude is variable. During the 1981 season the amplitude was $\sim$ 0.07 mag while during 1982 observing run it was $\sim$ 0.11 mag. The recent photometry shows that the amplitude of light variation has decreased to about 0.015 mag.

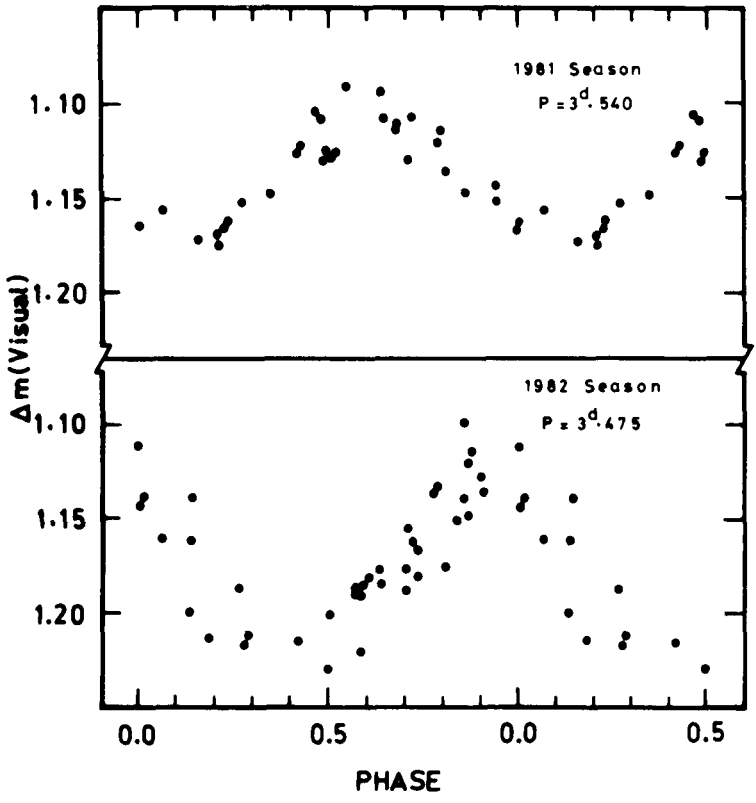

Fig. 1. Light curves of BD+25°2511 obtained during the 1981 and 1982 seasons.

https://doi.org/10.1017/S0252921100088539 Published online by Cambridge University Press

The nature of the light curves shows that the cause for the observed light variation is not geometrical eclipses. Most likely, in BD + 25°2511 we are seeing the type of 'activity' exhibited by the well-known RS Canum Venaticorum and BY Draconis variables, where the photometric variation is attributed to the presence of 'starspots' which rotationally modulate the observed flux. A detailed analysis of the available data including the spectrophotometric scans obtained with the automated spectrum scanner attached to the 102-cm Cassegrain reflector of the Kavalur Observatory is in progress and will be published elsewhere.

Acknowledgement

I am thankful to Mr. K. Jayakumar and Mr. M. J. Rosario for their help in collecting the photometric data.

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