

ON THE LIGHT VARIATION OF THE SPECTROSCOPIC BINARY 66 ERIDANI

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1. INTRODUCTION AND OBSERVATIONS

66 Eridani (HD 32964) is a spectroscopic binary of early spectral type. The binary character of this 5th magnitude star was first announced by Campbell (1918). The spectroscopic orbit was studied by Frost (1918) and Frost and Struve (1924). They gave the period as $5^d.52242$.

Stebbins (1928) had published photoelectric observations of this star, made with a photocell and a string electrometer. His observations do not show any light variation greater than $0^m.064$. The coverage is rather scanty. The latest study by Hogg et al (1951) also concludes that there is no light variation greater than $0^m.070$. However, their observations also are scanty, particularly at the eclipse times. The latest study by Young (1976) concludes from his single night observations that it is not an eclipsing binary.

The Finding List of Eclipsing Variables (Koch 1963) carries a remark that photometry for this system is 'greatly desirable'. Also, Batten's (1967) Catalogue of Spectroscopic Binaries has a remark stating that 'the reality of its light variation is doubtful'. Thus the existing contradictions, uncertainties and accuracies of previous investigations prompted us to undertake a detailed photometric investigation of this system.

2. EQUIPMENT AND OBSERVATIONS

The 15" Refractor of the Nizamiah Observatory, Hyderabad, was used for the purpose, in combination with an unrefrigerated 1P21 photomultiplier, a DC Amplifier (GEC) and a Honeywell-Brown Recorder. The light was measured in Johnson B and V filters.

66 Eridani was observed on a total of eighteen (18) nights over the interval November 30, 1975 to February 8, 1976. Table 1 summarises the relevant data, as given in the HD and BS Catalogues, regarding the comparison, the check and the variable.

TABLE 1
Data for variable, comparison and check stars

Star	HD Number	Co-ordinates (1900)		Spectral Type	Magnitude
		α	δ		
		h m s			
Variable	32964	05 01 49	$-4^\circ 47'$	B9	5.12
Comparison	33256	05 03 46	$-4^\circ 35'$	F5V	5.11
Check	32622	04 59 24	$-6^\circ 10'$	B9	6.72

The check star was observed on ten (10) nights. The magnitude differences in the sense (Check-comparison) are plotted against HJD in fig. 1; no variation was found greater than $0^m.031$ in B and $0^m.028$ in V filter.

A total of 168 magnitude estimates in B and 163 in V were obtained for the variable star over the period of observation. From these, 52 normal points were formed for V filter and 58 for B filter. These have been plotted in fig. 2 against phase in fraction of a period. For the calculation of phases, the values of T_0 (time of periastron passage), orbital eccentricity and period P as given by Frost and Struve (1924) were used. Eclipse times were calculated from these elements using Alleghany Tables, and are given by

$$T_0 (\text{eclipse}) = 2423089.2042 + 5^d.52242 \times E.$$

Stebbins (1928) had used the light elements $T_0 (\text{eclipse}) = 2423089.266$ and $P = 5^d.52242$, which he obtained from Frost (1924). Minima, according to these elements, are marked in fig. 2 with arrows.

3. CONCLUSION

We have covered the predicted minima adequately and also other phases throughout the cycle. No attempt was made to fix some other period with the present observations as the spread in magnitudes was of the same order as the

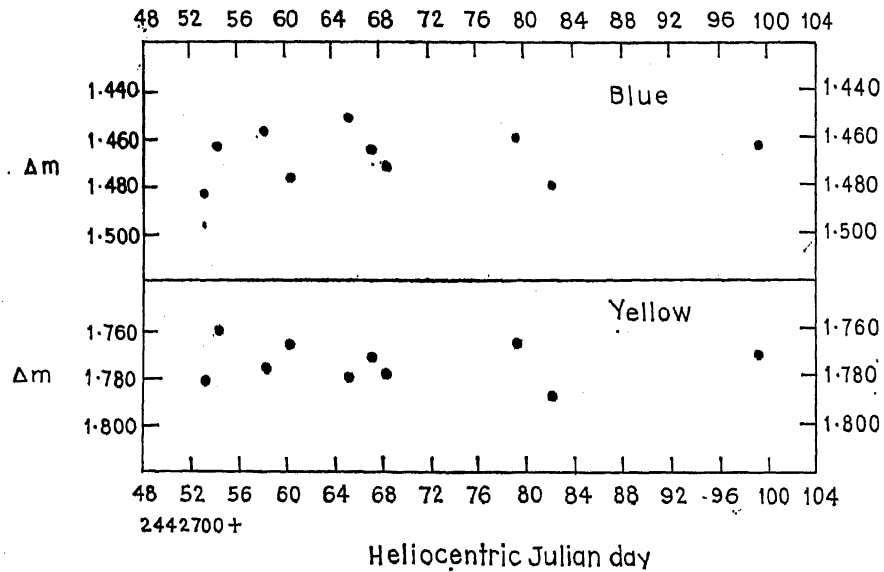


Fig. 1 : A plot of the magnitude difference as a function of Heliocentric Julian day.

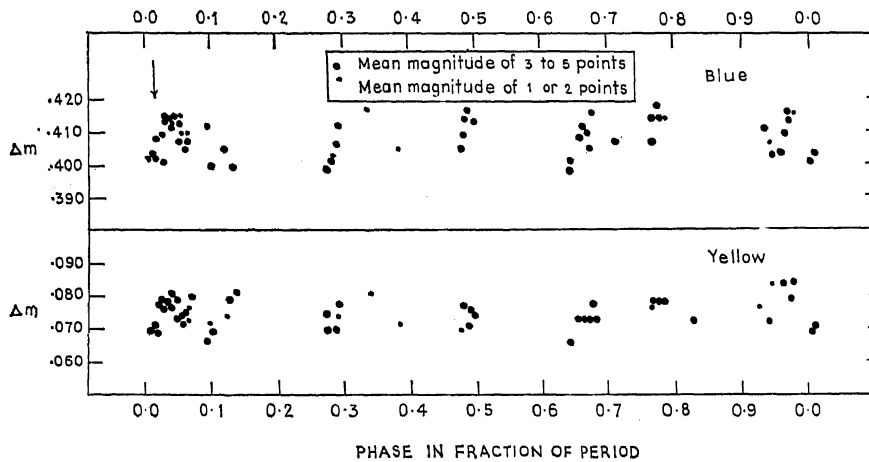


Fig. 2 : Mean magnitudes are plotted as a function of phase in fraction of a period.

observational errors. In V filter, the probable error of a single measurement was $\pm 0^{\text{m}}.006$ in (var-comp) compared to $\pm 0^{\text{m}}.007$ in (check-comp). In B filter, the corresponding values were $\pm 0^{\text{m}}.006$ and $\pm 0^{\text{m}}.008$ respectively.

Hence, it can be safely concluded that the system 66 Eri does not show light variation greater than $0^{\text{m}}.020$ in B filter and $0^{\text{m}}.019$ in V filter.

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