

THE SYMBIOTIC BINARY SYSTEM EG ANDROMEDAE

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ABSTRACT. Photometric observations of the symbiotic star EG And confirm that the binary system is eclipsing. The epoch of primary minimum is computed. The new period 474 days instead of 470 days is estimated by a comparison of line profiles of Balmer lines taken in 1967-69 and 1982-84. The new ephemeris is

$$JD_{\min.} = 2\ 446\ 336.7 + 474\ E. \quad (1)$$

1. INTRODUCTION

The symbiotic star EG And exhibits the optical absorption spectrum of a M2 III star, but also shows Balmer and nebular emission lines. Smith (1980) proposed a period of 470 days for the changes of strength and radial velocity of the H α emission line. As was pointed out by Oliverson et al. (1985) high dispersion IUE and optical spectra show remarkable emission-line strength and profile variations in agreement with this period. UV color-color diagnostic developed by Kenyon (1983) gave very strong support for the existence of a hot stellar companion of a cool giant. Detection of the orbital motion of the cool giant made by Oliverson et al. (1985) established EG And as a symbiotic binary system. They interpreted the behaviour of the emission lines as indication that a hot companion with surrounding nebula is eclipsed by the cool M giant. The eclipsing nature of the system is supported by photometry made by Kaler and Hickey (1983), who discovered that the Strömgren u magnitude fluctuated by 0.97 mag. Minimum of u brightness coincided closely with the variations of the far UV continuum (Stencel, 1982).

The aim of this paper is to confirm the eclipsing nature of the system from photometric observations and to show from

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spectroscopic observations that the orbital period is closed to 474 days.

2. OBSERVATIONAL MATERIAL AND RESULTS

UBV photometry of EG And was obtained by single channel photoelectric photometer installed in the Cassegrain focus of 0.6 m telescope at Skalnaté Pleso Observatory. The star HD 3914 ($V = 7.0$, $B-V = 0.44$) was used as a comparison star. The differential UBV photometry $m = m(\text{EG And}) - m(\text{HD 3914})$ is presented in Fig. 1. The light curves show that EG And is eclipsing binary. The eclipse is more pronounced in U than in B and V. The time of minimum computed from U light curve is $JD_{\min} = 2\,446\,336.7$.

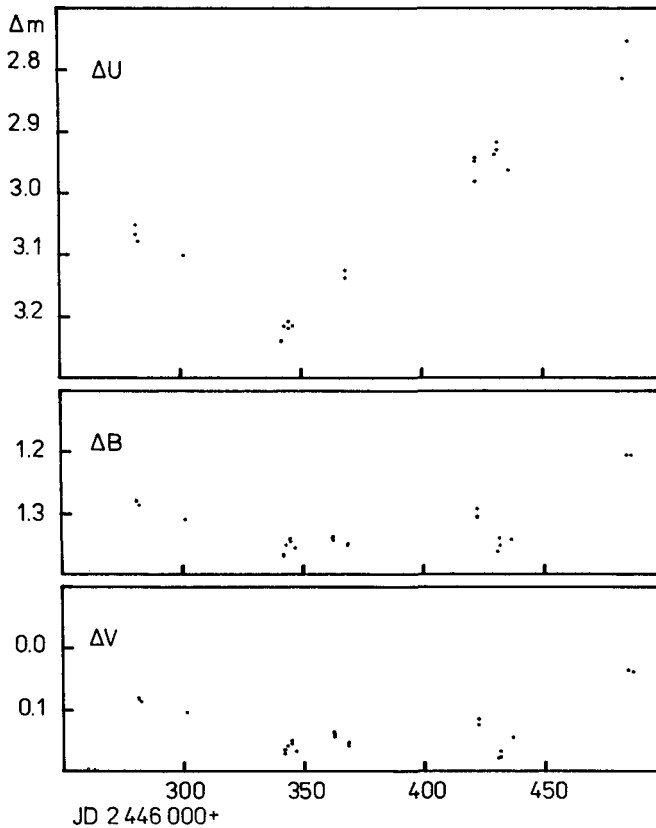


Figure 1. Differential UBV photometry of EG And.

Spectroscopic observations of EG And have been carried on at the Asiago Astrophysical Observatory in the years 1967-69 and 1983. The spectra were obtained at the Cassegrain focus of 1.22 m telescope with a prism spectrograph equipped with a Carnegie-RCA S-20 image intensifier operated at a reciprocal dispersion of 6 nm/mm at H_{γ} . Fig. 2 displays intensity line profiles of absorption and emission lines in the region of H_{γ} . The H_{γ} profile is clearly phase-dependent. The same behaviour showed the H_{α} profiles published by Oliver-
sen et al. (1985).

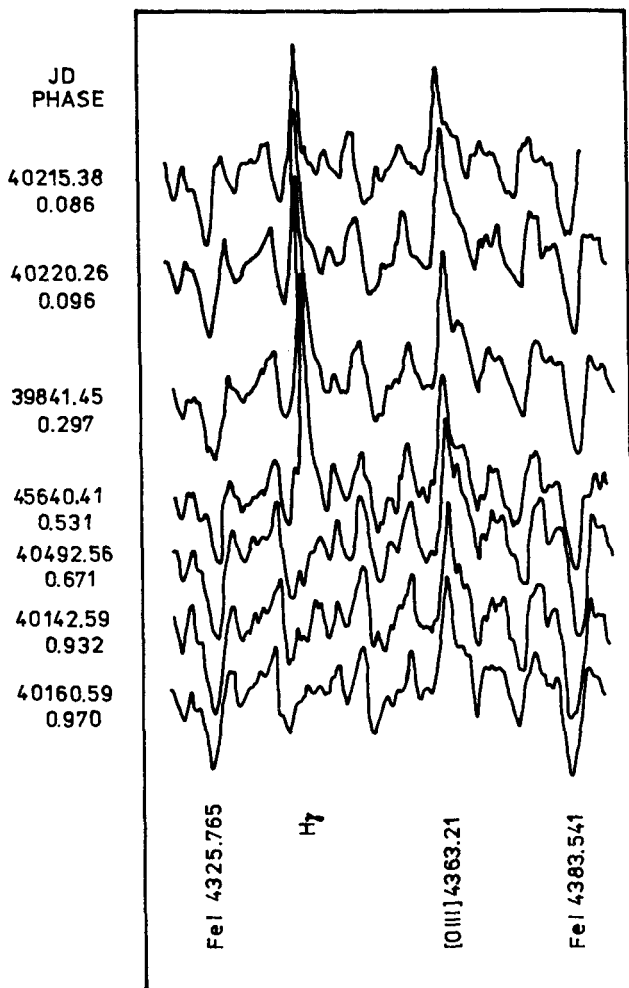


Figure 2. Phase dependence of H_{γ} line. Phases are computed according to ephemeris (1).

There is a contradiction between the 1967-69 (our data) and the 1982-84 (Oliveresen et al., 1985) Balmer line profiles phase-dependence, if the 470-days period is taken. The profiles in 1967-69 come to appropriate phases if the orbital period 470 days is replaced by the period 474 days. This value is close to the period 475 ± 2 days proposed for the system by Stencel (1983).

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