PRELIMINARY MODEL FOR THE SHORT-PERIOD BINARY SYSTEM V502 Cyg

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1. Abstract

The short-period binary system V502 Cyg is here analysed with the purpose of the preliminary determination of its orbital parameters. For the star we were able to determine the Mass Ratio (q), Inclination (i), Fill-out factor (f), the Mean Fractional Ratios (R1,R2) and Fractional Luminosity (L1,L2). The temperatures (T1,T2) were adjusted with respect to the spectral types suggested in the original publication by Zakyrov M.M.

2. Introduction

The variability of brightness of V502 Cyg (S 4523 , GSC 3160_0642, m = 13,6 – 14,5 mag. Pg) α 20h 26m 27s.76 δ +42°41'45''.3 (Kinnunen & Skiff, 2000) was discovered by Hoffmeister C. (1949) during a photographic survey in a field around α 20h 58m δ +44°, who find the type of variability (eclipsing binary) and light elements P= 0,45d.
However next observation did not confirm his elements (Romano, 1969).
Correct light elements were found by Kurochkin N.E. (1977), who used all published times of minimum for V502 Cyg and he obtained

$$\text{Min I= JHD } 2438299{,}309 + 0{,}566958 * E$$

In his paper Kurochkin found that the light curve shown a small difference in the height of maxima, MAX I=13,6 mag, MAX II= 13,8 mag.
The unequal height or/and asymmetry of the maxima in the light curves is knew as O'Connel effect (1951) and may be attributed to active dark or hot regions on the surface of the system's components.
New observations for V502 Cyg was obtained by Zakirov M.M. (1997) during a photoelectric survey in the T-association Cyg T2. In these observations the star did not show the O'Connel effect.
Using the original V observation obtained from the CDS Internet site (http://csweb.u-strasbg.fr/cats/) we present the example model for V502 Cyg, computed making use of Binary Maker v2.0 (Bradstreet, 1993).

3. Light curve model

Using Binary Maker, for V502 Cyg we construct a three dimensional example model assuming the temperature of both the stars adjusted with respect to the spectral types suggested in the original publication, classified as A5V and F8V.

A satisfactory fit to the data was found with a Mass Ratio of 2.266, Inclination of 80° and Fill-Out factor of 0,04. The Mean Fractional Radii for the stars are R1 = 0,454 and R2 = 0,312 while the Fractional Luminosities are L1 = 0,49 and L2 = 0,51.
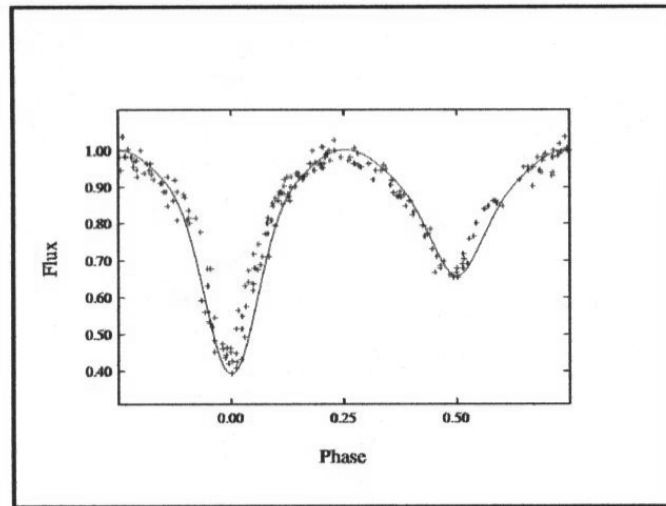The best fit (example model) and the aspect of the system at significant orbital phase, are shown in Figures 1 and 2.

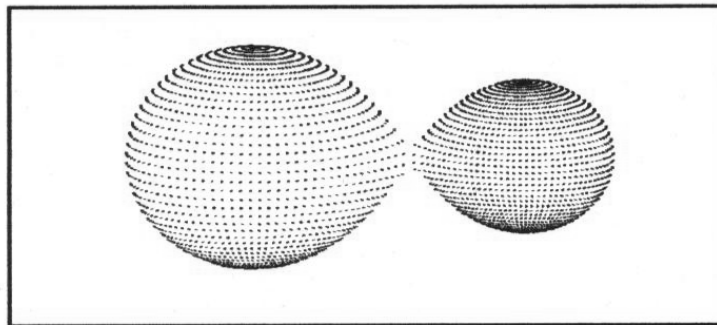**Figure 1.** Original points with curve from an example model of the eclipsing system

Figure 2. Three-dimensional model of V502 Cyg at phase 0,75

Bibliography

Bradstreet H. David , 1993, Binary Maker 2.0, User Manual, Contact Software.

Hoffmeister C. , 1949, Veroffentlichungen der Sternwarte in Sonneberg, Band 1, Nummer 3, 304

Kunninen T., Skiff Brian A. , 2000, IBVS 4906

Kurochkin N.E. , 1977, Variable Stars, 20, 325

O'Connel D.J.K. , 1951, Pub. Riverview College Obs., 2,85.-

Romano G. , 1969, Padova Publ. N° 156

Zakirov M.M. , 1997, Pis'ma Astron. Zh., 23, 458