ON THE DISTORTION WAVE IN THE SHORT PERIOD RS CVn TYPE ECLIPSING BINARY WY CANCRI

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The eclipsing binary WY Cancri (G5 V, M2 V), having a period of $0^d.82937122$, has been classified as a short period RS CVn type binary (Hall, 1976). Chambliss (1965), Oliver (1974), Sarma (1976), Awadulla and Budding (1979) have reported observations of this system. In order to determine a more reliable period of the distortion wave, its source, nature and period of the overall luminosity change from one observing season to the next, we have included this star in the observing schedule of RS CVn binaries at our observatory. Observations were made in standard UBV filters using the 48-inch reflector telescope of the Japal-Rangapur Observatory. The stars BD+28° 1672 and BD+27° 1701 were used as a comparison and check stars respectively. The light curves in yellow and blue colours for 1973, '76, '77 and '78 are shown in figure 1 which shows the following features:

(i) Changes in overall luminosity outside the eclipses from one observing season to the next.
(ii) Presence of the distortion wave outside the eclipses.
(iii) Variation in the depth of the primary minimum which is not very prominent compared to the secondary.

The light outside the eclipse (θ_e=26°) for all the years was represented by a truncated Fourier series of four terms. The Fourier coefficients of the cosθ terms comprise of two parts: (i) due to the reflection and eclipticity effects and (ii) due to the wave. Theoretical values of the reflection and eclipticity effects were obtained using Merrill's (1970) equations. After removing the reflection and ellipticity terms from the derived Fourier coefficients for each year, the semiamplitudes $K_1=(A_1^2(\text{wave})+B_1^2)^{\frac{1}{2}}$ and $K_2=(A_2^2(\text{wave})+B_2^2)^{\frac{1}{2}}$ and the minima (θ^{I}_{min} and θ^{II}_{min}) of the distortion wave were derived. It was found that A_3(wave), A_4(wave), B_3 and B_4 do not make any significant contribution to the distortion wave. The semiamplitudes K_1 and K_2 of the distortion wave are found to vary from year to year (range 0.002-

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0.021) and are found to be independent of wavelength. From a plot of θ^{I}_{min} and θ^{II}_{min} versus mean HJD it was found that the distortion wave in WY Cancri completes one cycle in a period of about 3 years and appears to migrate towards increasing orbital phase which is in contradiction to the conclusions of Oliver (1974). Taking the values of L_h and L_c from Awadulla and Budding (1979) the percentages of light contributed by the wave were determined. From these percentages it is clear that the hotter component is responsible for the distortion wave in WY Cancri. In order to find which component is responsible for the overall light variation outside the eclipses, we have proceeded as follows. Taking the average light level outside the eclipse for the 1973-'74 light curve as standard, the difference in light was determined for the light curves obtained by us, Chambliss (1965) and Oliver (1974). The percentage of light contributed by these variations with respect to L_h and L_c were obtained. Here once again we found that the hotter component is responsible for the overall light variations outside the eclipses. To determine the periodicity of these average light variations we made a plot of the average light outside the eclipse versus the year of observation taking the 1973-74 curve as standard. From this plot we found that the period of the light variations outside eclipse is of the order of 30 years or more.

A more detailed account of this paper will be submitted to the Journal of Astrophysics and Astronomy in 1983.

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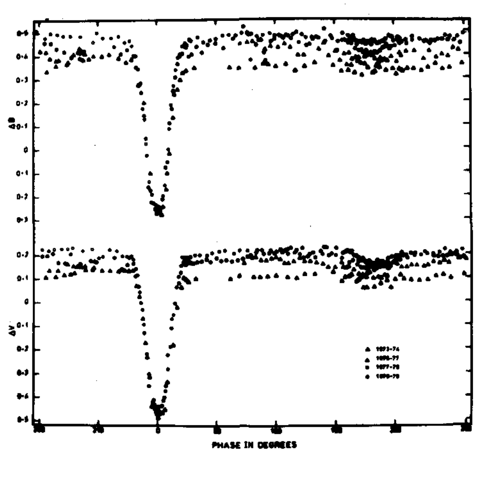

Figure 1. Blue and Yellow Light Curves of WY Cancri

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