Light Curve Analysis and Evolutionary Status of the RS CVn type Eclipsing Binary RZ Eridani

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Photoelectric observations of the long period RS CVn type eclipsing binary RZ Eridani were made with the 1.2m reflecting telescope of the Japal - Rangapur Observatory during the observing seasons 1976-79. We could not obtain a full light curve in any one season and therefore the combined light curve is used for analysis. No distortion wave was found in this system. The period of the system ($39^{d}.282466$) is found to be constant during the period 1906 to 1979. From W-D solution we obtained the eccentricity to be zero whereas Popper (private communication) from his spectroscopic studies, suggested a value of e = 0.339 for the eccentricity. Such disagreement between the photometric & spectroscopic eccentricity values is reported in the system SX Cas (Struve 1944 Ap.J, 99, 89., Shao 1967 A.J, 72, 480). This might be due to circumstellar matter covering the whole system. The ultraviolet excess found by us in RZ Eri is similar to that found in systems like SX Cas, RX Cas, β Lyr & W Ser where the excess is attributed to gaseous envelope surrounding the hotter component. The presence of envelope in RZ Eri, can be confirmed by UV observations or further high resolution spectroscopy. From the derived radii, masses, temperatures, colours and Bolometric magnitudes it is found that the system RZ Eri consists of an A5-F5 IV primary and G7 $\pm$4 III secondary. From the HR diagrams, it is found that both the components are evolved and lie above the main sequence. From the mass ratio of q = 1.0011 and radii, r_h =0.0474 & r_c = 0.1268 the components are found to be well within their Roche lobes thereby giving a detached status for this system. The theoretical light curve indicates a probable existence of a secondary minimum around phase $0^{P}.5$ with a small depth. But our observations do not cover this region adequately. Caton (1986, A.J, 91, 132) suggested the existence of secondary at 0.67 phase. Our observations, covering this phase do not confirm their findings. Hence we suggest further photoelectric observations around $0^{P}.5$ to confirm the theoretical prediction. A detailed version of this communication will be published elsewhere.

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