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COMMENTS ON THE LIGHT CURVE OF V878 Her

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Kaiser (1994) reported on the eclipsing system V878 Her = SAO 46698 = BD +49°2630 = GSC 3516-00047 = DHK 40. Kaiser et al. (1996) later published a period and V light curve that showed Beta Lyrae-like variations for this $V = 9^m.4$ star. During June 1999 we recorded 76 V and 44 R images with a liquid nitrogen-cooled Photometrics CCD attached to the Air Force Academy's 0.61-m reflector. Images were bias subtracted and flat fielded, and magnitudes of the variable and several nearby stars were extracted using IRAF routines. The check star (GSC 3516-00161, $V = 14^m.4$) and the comparison star (GSC 3516-00768, $V = 12^m.7$) were within the $3'.7$ field. We found the 76 differences in magnitude between these two stars in V light had a standard deviation of $0^m.025$ and the 44 differences in R had a standard deviation of $0^m.037$ indicating their reasonable stability. The check star may be slightly variable, however.

Using the method of Kwee–Van Woerden we established one new time of secondary minimum light:

$$\text{Min. II} = \text{HJD } 2451338.7938 \pm 0.0040$$

Using a linear least squares fitting routine and weighting all the times given by Kaiser and the current paper by the inverse square of their standard errors (estimating the standard error of the old photographic times as $0^d.05$), we found new light elements hardly significantly different from Kaiser's:

$$\text{Min. I} = \text{HJD } 2449922.70700 + 0^d.5294771 \times E. \\ \pm 0.00008 \quad \pm 0.0000007$$

The $O - C$'s indicate no definite period changes over the 14315 epochs used for this period study.

The V and R magnitudes were converted to intensities and were then formed into normal points by averaging over phase bins 0.02 wide.

To achieve a preliminary solution, the intensity normal points were fitted with a theoretical curve using the program *Binary Maker 2.0* by David Bradstreet. We assumed a temperature of 6100 K for the F8 primary star. Figure 1 shows the fit for the V light curve when the inclination is set at 62° , the secondary star has a temperature of 4450 K, and the “near contact” configuration suggested by Kaiser. We concur with Kaiser that the maximum at phase 0.25 is slightly brighter than that at 0.75, by approximately $0^m.02$. There was too little R data to determine a solution, though is not inconsistent with that given here for V . The depths of the eclipses relative to the brighter maximum are $0^m.47$

and 0^m21 in V , and approximately 0^m42 and 0^m23 in R light. We hope to acquire more photometric data, especially in the R , so that we can find a more definitive solution for the system.

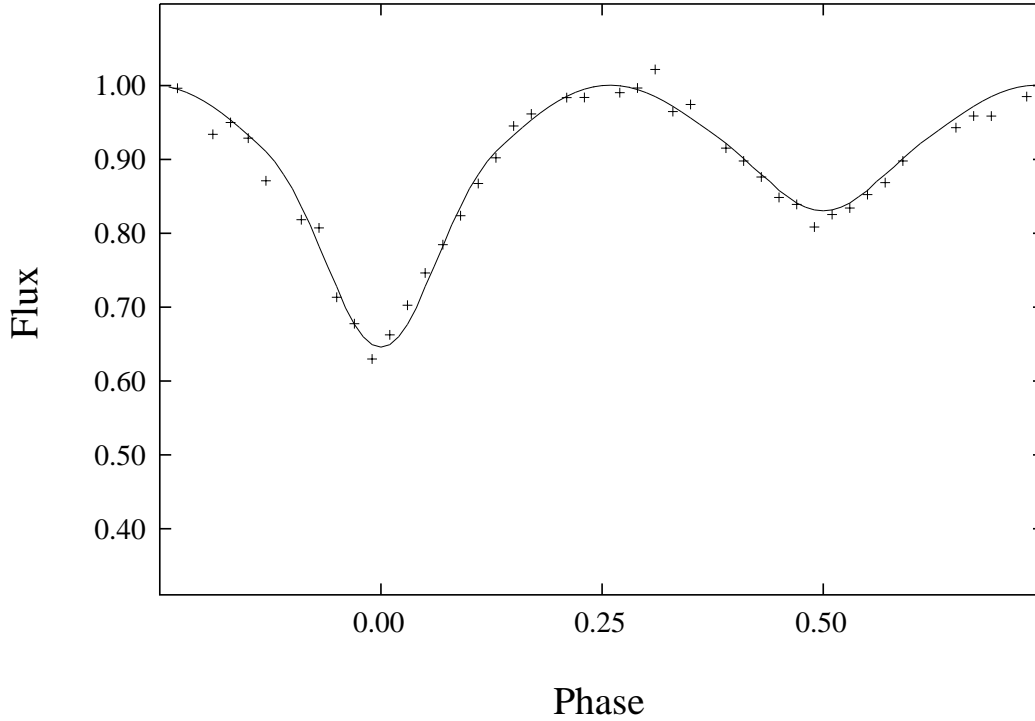


Figure 1. V Intensity Light Curve and Binary Maker Fit

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References:

- Bradstreet, D.H., 1993, *Binary Maker 2.0 Light Curve Synthesis Program*, Contact Software, Norristown, PA 19401-55055, USA
 Kaiser, D.H., 1994, *Inform. Bull. Var. Stars*, No. 4119
 Kaiser, D.H., Lubcke, G, Williams, D.B., 1996, *Inform. Bull. Var. Stars*, No. 4284