

The first photometric analyses and classification of the W-UMa eclipsing binary systems GSC 1283-53 and GSC 702-1892

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Abstract New CCD observations of the W UMa type binary systems GSC 1283-53 and GSC 702-1892 have been analyzed using the Wilson–Devinney Code to determine their photometric and geometric elements. The results show that the system GSC 1283-53 may be classified as A-subtype W UMa eclipsing binary with a photometric mass ratio $q = 0.277$, and the degree of over contact $f = 83.5\%$. While the system GSC 702-1892 is found to be a detached eclipsing binary with the photometric mass ratio $q = 0.49$.

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1. Introduction

The eclipsing binary system GSC 1283-53 (ASAS J051305 + 155812 = NSVS 9553026 = 2MASS J05130606 + 1558122 = TYC 1283-53-1), with the coordinates $\alpha_{2000} = 05^{\text{h}} 13^{\text{m}} 06.069^{\text{s}}$, $\delta_{2000} = 15^{\circ} 58' 12.22''$, was discovered to be a variable by Blattler and Diethelm (2007). They used a CCD camera attached to the Cassegrain 0.15-m Starfire refractor (Private observatory Schüsselacher) in Wald, Switzerland. They classified the system as W UMa eclipsing binary, with a period 0.383004^d.

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The other eclipsing binary system GSC 702-1892 (ASAS J051245 + 101512 = NSVS 9512770 = 2MASS J05124486 + 1015104), which has the coordinates $\alpha_{2000} = 05^{\text{h}} 12^{\text{m}} 44.8^{\text{s}}$, $\delta_{2000} = 10^{\circ} 15' 10''$, was discovered to be a variable by Blattler and Diethelm (2007). They classified the system as W UMa eclipsing binary with $V_{\text{mag}} = 11.9$ and $R_{\text{mag}} = 12.6$, and its period equals 0.276945^d.

2. Observations

Two sets of non-analyzed V and R band observational data for the eclipsing binary system GSC 1283-53 have been observed by Blattler and Diethelm, during the time interval between Dec. 13, 2006 and Jan. 14, 2007. They used a CCD camera (SBIG ST-7) attached to the Cassegrain 0.15-m Starfire refractor (Private observatory Schüsselacher) in Wald, Switzerland.

The phase curves based on 236 observations in both colors V and R were obtained, using SAO 94388 (9.19 V_{mag}) as comparison star and GSC 1283-239 (11.01 V_{mag}) as check star.

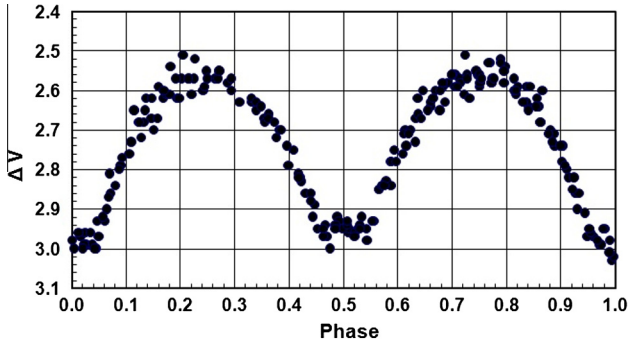


Fig. 1 Light curve for GSC 1283-53 in V -band.

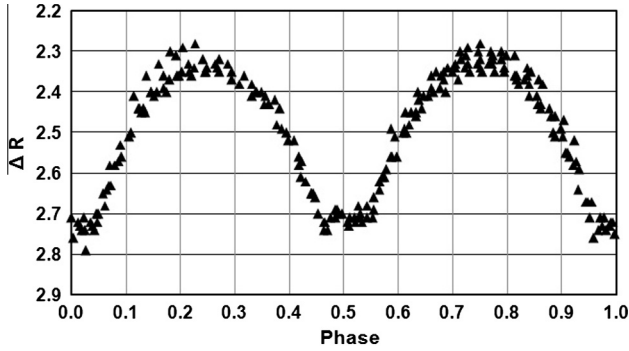


Fig. 2 Light curve for GSC 1283-53 in R -band.

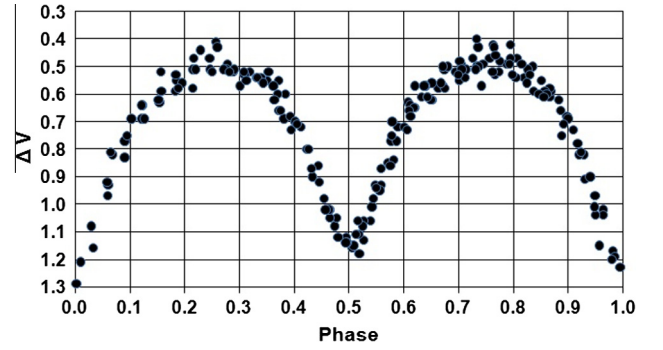


Fig. 3 Light curve for GSC 702-1892 in V -band.

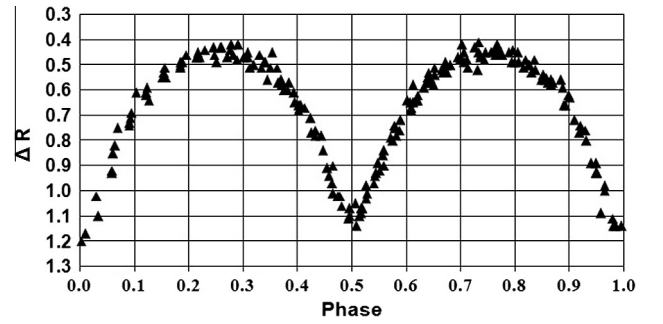


Fig. 4 Light curve for GSC 702-1892 in R -band.

Blattler and Diethelm (2007) determined the mean epoch of minimum light from the 12 times of minima. They determined the new ephemeris as follows:

$$JD(\text{Min. } I, \text{ Hel}) = 2454066.5778 + 0.383004 \times E$$

where E is the number of integer cycles. This ephemeris was used to calculate the phases and draw the light curves in both V and R bands as differential magnitude ΔV and ΔR (see Figs. 1 and 2).

The other sets of non-analyzed CCD observational data in V and R bands for the eclipsing binary system GSC 702-1892 have been obtained by Blattler and Diethelm (2007), using SBIG ST-7 camera attached to the Cassegrain, 0.15-m Starfire

refractor (Private observatory Schüsselacher) in Wald, Switzerland. The observations were made during five nights between Dec. 13, 2006 and Jan. 14, 2007. A total of 221 measurements in both colors were obtained, using GSC 702-2174 (11.03 V_{mag}) as comparison and GSC 702-2730 (12.42 V_{mag}) as check star.

Nelson (2004) determined the light elements for the system as follows:

$$JD(\text{Min. } I, \text{ Hel}) = 2454083.5159 + 0.276945 \times E$$

where E is the number of integer cycles. This ephemeris was used to calculate the phases and draw the light curves in both V and R bands as differential magnitude ΔV and ΔR (see Figs. 3 and 4).

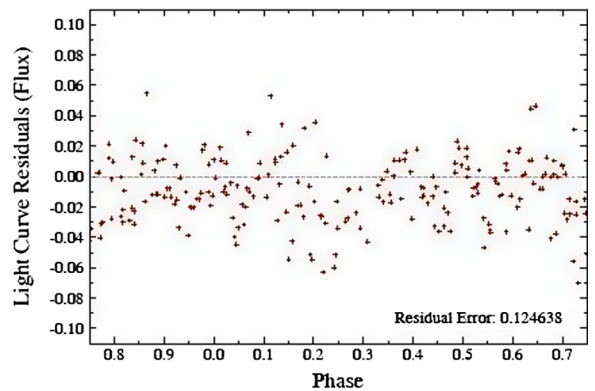
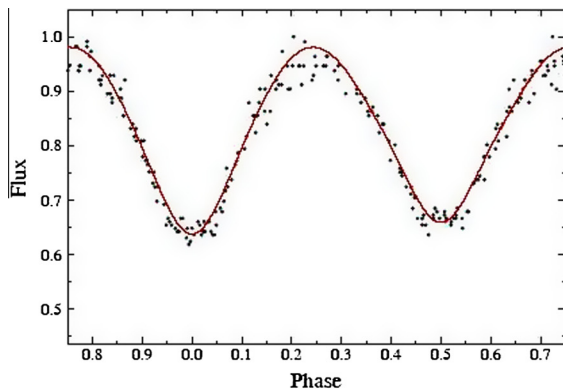


Fig. 5 V light curve of GSC 1283-53 (crosses) together with their Fitting (solid line) in Left Panel, while the Light Curve Residual shown in right panel.

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