

PHOTOMETRIC ANALYSIS OF ECLIPSING BINARIES IN THE REGION OF HYDRA CONSTELLATION BY USING TESS MISSION DATA

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Eclipsing binaries provide more reliable and accurate samples for studying stellar evolution. In this study, we considered four W UMa type eclipsing binaries to determine their stellar parameters and the physical nature of each system. The photometric data of target stars, EG Hya, V0404 Hya, V0452 Hya and V0483 Hya, were obtained from the TESS mission. The Lightkurve python package is used to extract light curves from TESS full-frame images. The stellar parameters were obtained using the PHOEBE 1 program based on Wilson-Devinney code modeling until the minimum values of residuals were obtained. We determined that all the stars had periods between 0.61139 ± 0.00001 to 0.29660 ± 0.00009 days, where EG Hya and V452 Hya have the highest and the lowest values, respectively. V0404 Hya and V0483 Hya recorded 0.3096 ± 0.0003 and 0.4075 ± 0.0003 days for the period of eclipses, respectively. Considering the mass ratio q of each system EG Hya and V0483 Hya had the lowest mass ratios of $q = 0.1256 \pm 0.0002$ and $q = 0.1058 \pm 0.0004$, respectively, while V0404 Hya and V0452 Hya had the highest mass ratios of $q = 0.5625 \pm 0.0006$ and $q = 0.566 \pm 0.002$, respectively. Depending on the value of the fill-out factor (f), a totally eclipsing binary system EG Hya ($f = 7.23\%$) and V0452 ($f = 0.18\%$) were found to be marginal contact binaries, and V0404 Hya ($f = 46.49\%$) and V0483 Hya ($f = 14.58\%$) were identified as over-contacting binary systems. Further, system parameters such as inclination and effective temperatures were derived, and the physical model of each system was discussed.

Keywords: Lightcurve modeling, Marginal-contact binaries, Over-contact binaries, Wilson-Devinney