Revista Mexicana de Astronomía y Astrofísica, **47**, 297–307 (2011)

V1898 CYGNI: AN INTERACTING ECLIPSING BINARY IN THE VICINITY OF NORTH AMERICA NEBULA[1]

A. Dervişoğlu,[2] Ö. Çakırlı,[2,3] C. İbanoğlu,[2] and E. Sipahi[2]

Received 2011 April 12; accepted 2011 June 12

RESUMEN

Presentamos observaciones espectroscópicas de la binaria eclipsante tipo Algol, de doble línea, V1898 Cygni. El análisis de las curvas de luz en las bandas BV nos lleva a una determinación de los parámetros fundamentales de las componentes de V1898 Cygni. Los parámetros absolutos son: $M_1 = 6.054 \pm 0.037\ M_\odot$, $M_2 = 1.162 \pm 0.011\ M_\odot$, $R_1 = 3.526 \pm 0.009\ R_\odot$, $R_2 = 2.640 \pm 0.010\ R_\odot$, $T_{\rm eff_1} = 18000 \pm 600$ K, y $T_{\rm eff_2} = 6200 \pm 200$ K. Analizamos los residuos entre los tiempos observados y calculados para el eclipse medio y obtenemos una tasa de cambio del período de $\dot{P}/P = 6.68 \times 10^{-7}$ yr^{-1}. Estimamos una tasa de transferencia de masa de $1.88 \times 10^{-7}\ M_\odot$ por año. Utilizando las magnitudes infrarojas JHK y las correcciones bolométricas para la estrella primaria, calculamos la distancia al sistema V1898 Cyg como 501 ± 5 pc. Las componentes de los movimientos propios del sistema presentan alguna información sobre su pertenencia a la Nebulosa de Norteamérica.

ABSTRACT

We present spectroscopic observations of the double-lined Algol type eclipsing binary V1898 Cyg. Analyses of the BV light curves and RVs led to determination of the fundamental stellar parameters of the V1898 Cyg's components. The absolute parameters for the stars are derived as: $M_1 = 6.054 \pm 0.037\ M_\odot$, $M_2 = 1.162 \pm 0.011\ M_\odot$, $R_1 = 3.526 \pm 0.009\ R_\odot$, $R_2 = 2.640 \pm 0.010\ R_\odot$, $T_{\rm eff_1} = 18000 \pm 600$ K, and $T_{\rm eff_2} = 6200 \pm 200$ K. The residuals between the observed and computed times of mid-eclipses were analysed and a rate of the period change $\dot{P}/P = 6.68 \times 10^{-7}$ yr^{-1} was obtained; a mass transfer rate of $1.88 \times 10^{-7}\ M_\odot$ in a year is estimated. We have calculated the distance to the system V1898 Cyg as 501 ± 5 pc using the infrared JHK magnitudes and bolometric corrections for the primary star. The components of the system's proper motions present some indications about membership to the North America nebula.

Key Words: binaries: close — binaries: eclipsing — binaries: general — binaries: spectroscopic — stars: individual (V1898 Cyg)

1. INTRODUCTION

V1898 Cyg (HD 200776, BD +45° 3384, 2MASS J21035377+4619499, HIP 103968, $V = 7^m.81$, $(B - V) = +0^m.01$) was discovered to be a single-lined spectroscopic binary by Abt, Levy, & Gandet (1972). HD 200776 was included in the list of bright OB stars to be observed for the determination of galactic rotation constants and other galactic parameters. Their spectroscopic observations yield that HD 200776 is a spectroscopic binary with an orbital period of 2.9258 days. They also calculated the preliminary elements and mass function for the system. McCrosky & Whitney (1982) searched for photometric variations in some short-period spectroscopic binaries (including HD 200776) given in the Seventh Catalogue of the Orbital Elements of Spectroscopic Binary System (Batten, Fletcher, & Mann 1978). They observed abrupt drops, amounting to

[1]Based on observations collected at Catania Astrophysical Observatory (Italy) and TÜBİTAK National Observatory (Antalya, Turkey).

[2]Department of Astronomy and Space Sciences, Science Faculty, Ege University, Turkey.

[3]TÜBİTAK National Observatory, Akdeniz University Campus, Turkey.