

THE OVERCONTACT BINARY SYSTEM NSV 05798

The variability of NSV 05798 (HV 10097, GSC 4951.0769, CSV 001901) was announced by Hughes Boyce (1939) in a photographic survey carried out by the Harvard College Observatory in 1939 with the 10-inch Metcalf triplet in South Africa. According to her measurements, she preliminarily classified the star as an overcontact binary star with a photographic range from 12^m2 to 12^m8. The star was catalogued as NSV 05798 (Kholopov, 1982) awaiting for further confirmation of Hughes' results. No ephemeris was given and type F is the only spectral information available.

During 18 nights, from March 21 to April 18, 1995, NSV 05798 was observed in the V band using a LYNXX-2 CCD camera, attached to the Newton focus of the 0.4-m telescope at Observatorio de Mollet (Spain). SAO 138882 was used as comparison star (see Figure 1).

The result of this surveillance program proved that NSV 05798 is an overcontact or nearly overcontact eclipsing binary star with a period slightly shorter than 9 hours. Figure 2 shows the obtained light curve in the V band. NSV 05798 fades 0.63 and 0.61 magnitudes at the primary and secondary minima respectively.

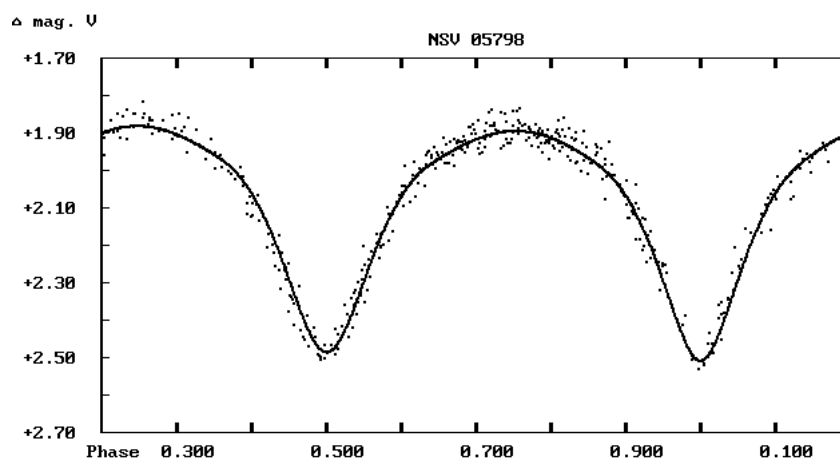


Figure 1

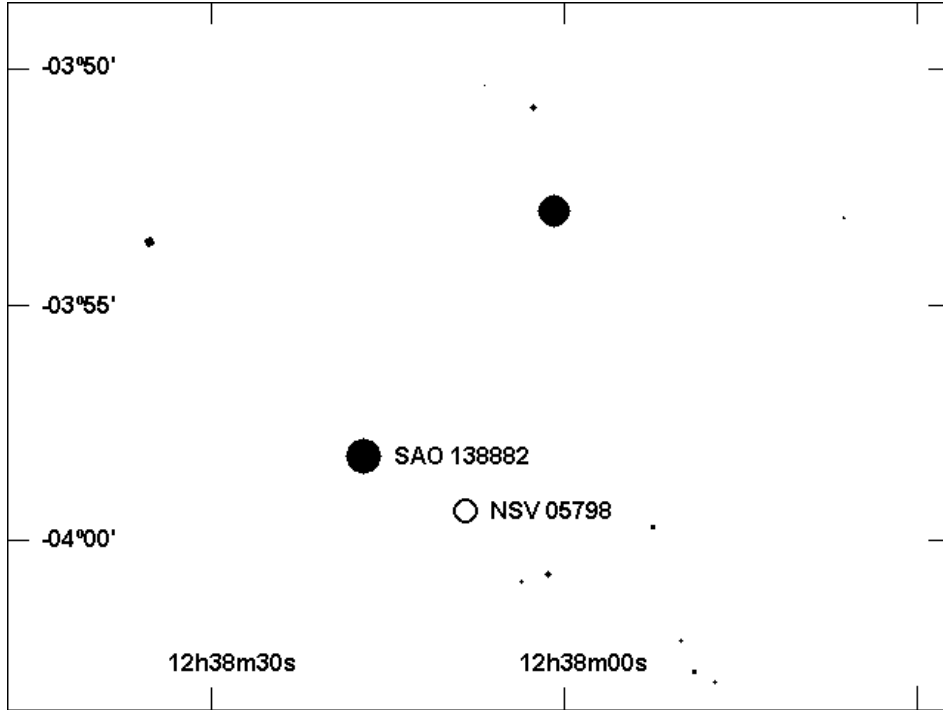


Figure 2. Light curve of NSV 05798 in the V band (points) and superimposed synthetic light curve (solid) for the given physical parameters.

From our set of data we computed the following ephemeris for the primary minimum:

$$\text{Min. I} = \text{HJD } 2449825.54948 + 0^{\text{d}}.36942 \times E$$

$$\pm 50 \qquad \pm 6$$

Although both minima are almost identical in depth, they are different in shape. The primary minimum is sharper than the secondary one, suggesting that during the primary we observe a transit while during the secondary we observe an occultation.

We used Binary Maker 2.0 (Bradstreet, 1993) to obtain the physical elements for the light curve (Figure 2). For an assumed spectral type F5V, we adopted a limb darkening coefficient of 0.6 for both stars and a gravity darkening coefficient of 0.32. We also adopted a value of 0.5 for the reflection coefficient. The physical elements in the V band are:

mass ratio	$q : 0.55 \pm 0.05$
fillout	$f : 0.02 \pm 0.02$
	$i : 79^{\circ}8 \pm 0^{\circ}2$
$a_g = 0.46 \pm 0.01$	$a_s = 0.36 \pm 0.01$
$b_g = 0.43 \pm 0.01$	$b_s = 0.32 \pm 0.01$
$c_g = 0.41 \pm 0.01$	$c_s = 0.31 \pm 0.01$
$d_g = 0.56 \pm 0.01$	$d_s = 0.44 \pm 0.01$
$L_1 = 0.64 \pm 0.02$	$L_2 = 0.36 \pm 0.02$
$g_1 = 0.32$	$g_2 = 0.32$
$x_1 = 0.60$	$x_2 = 0.60$
$A_1 = 0.5$	$A_2 = 0.5$
$T_1 = 6620\text{K} \pm 50\text{K}$	$T_2 = 6600\text{K} \pm 50\text{K}$

To have a deeper understanding of this binary system, it is important that future research on this star be directed to perform multicolor photometry, spectroscopic analysis to exactly determine its spectral type, and search for radial velocities.

Josep M. GOMEZ-FORRELLAD
Enrique GARCIA-MELENDO
Grup d'Estudis Astronòmics
Apartado 9481
08080 Barcelona
Spain
e-mail: jmgomez@astro.gea.cesca.es

References:

- Bradstreet, D. H., 1993, Binary Maker 2.0 User Manual, Contact Software, Norristown, Pennsylvania
Hughes Boyce, E., 1939, *Bulletin of the Harvard College Observatory*, No.911
Kholopov, P. N. editor, 1982, New Catalogue of Suspected Variable Stars, Moscow