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ON THE PERIOD OF THE W UMA STAR NSV 12040

Strohmeier and Knigge (1960) discovered the variability of NSV 12040 (CSV 8172, BD+52°2426), a 10th magnitude W UMa system in Cygnus. Boninsegna (1986) has used 85 visual times of minima to compute an ephemeris having a period of 0.34237 days. However, recent photometric observations are not consistent with this period.

Observations were obtained on five nights in April 1987 with the No. 2 0.9 meter telescope at Kitt Peak National Observatory using the Automatic Filter Photometer and a UBVR filter set. Additional observations were made on one night in August 1987 with the 0.4-meter telescope, pulse counting photometer, and BVR filter set at the Joseph R. Grundy Observatory of Franklin and Marshall College. Comparison and check stars were SAO 31626 and SAO 31624. Data were reduced to differential V magnitudes. Correction for extinction is not significant, and the data have not yet been transformed to the standard system.

Preliminary analysis of these photometric data show that they cannot be phased with the published period. Instead, the data require a slightly longer period differing in frequency by 0.5 c/day from the published period. This longer period allows the combination of the new photometric data with the 23 photometric observations published by Boninsegna (1986). (An arbitrary constant of 9.4 magnitudes has been subtracted from the published magnitudes to bring the data into agreement with the differential magnitudes described here).

The best period was determined by repeatedly phasing the combined dataset to obtain minimum scatter, and the best epoch of minimum was taken as the central time of the minimum observed on heliocentric JD 244 6907.9108. This minimum appears to be the deeper of the two by a small margin (Figure 1). Thus the revised heliocentric ephemeris is

$$\text{J.D. } 24\ 46907.9108 + 0.^d.4131856\ \text{E} \\ \pm .0003 \quad \pm .0000085$$

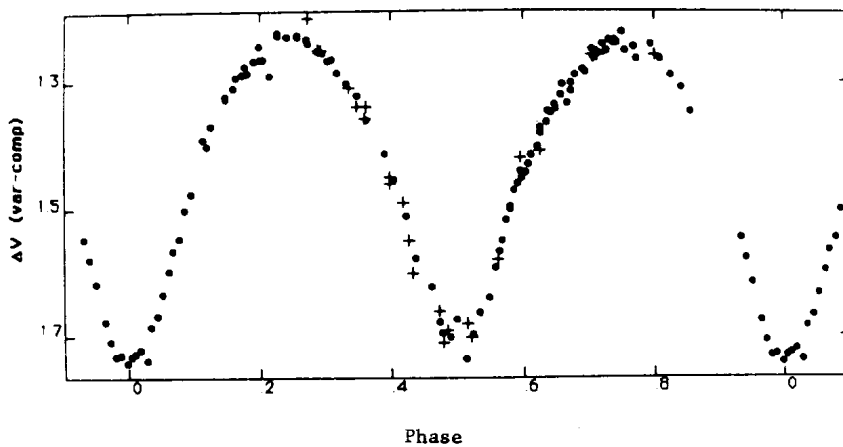


Figure 1

V magnitude differences (variable minus comparison) phased with the period 0.4131856 days produce minimum scatter. Crosses mark 23 published photometric observations (Boninsegna 1986) with an arbitrary constant of 9.4 magnitudes subtracted to bring them into agreement with the differential observations.

The quoted error in the epoch is the internal error derived from the bisection of chords method, and the quoted error in period is that error which noticeably increases scatter in the phased light curve.

The phased light curve shown in Figure 1 includes photometric data spanning 754 days, yet the scatter appears rather small. The 23 previously published data points (Boninsegna 1986) are shown as crosses. These data points include two minima which were originally presented as both the primary and secondary minimum, but this analysis shows that these two eclipses are both the shallower eclipse.

The observed B-V color of NSV 12040 as published by Boninsegna (1986) is +0.43, about 0.13 magnitudes bluer than is typical of the bluest contact binaries with periods of 0.34 days (Eggen 1967). That color is, however, marginally consistent with a period of 0.41 days. The revised period places the star at the blue edge of the contact star region of the period-color diagram.

The data reported here will be reduced and published with further analysis elsewhere. This work is supported in part by the National Science Foundation through grant No. PRM-8214360. Some of the data described here were obtained while the author was a visiting observer at Kitt Peak National Observatory, National Optical Astronomy Observatories, operated by the Association of Universities for Research in Astronomy, Inc., under contract with the National Science Foundation. The author would like to thank Sam Barden and Harold Nations for their assistance in obtaining the photometric data.

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