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1988 AND 1989 BV PHOTOMETRY OF WY Cnc

Among the short-period group of RS CVn stars, WY Cnc (= BD 27° 1706; #58 in the catalog of Strassmeier *et al.*, 1988) has been infrequently observed. In order to understand the magnetic activity of binary systems of cool stars, a long time base of continuous, high-quality observations is required. We report here on new BV observations that complement those of Zeilik *et al.* (1989).

We observed WY Cnc on the nights 10-15, 19-21 May 1989, and 8, 13, 18, 19 May 1988 using the 61-cm telescope operated by San Diego State University on Mt. Laguna, California. The photoelectric photometer, which uses an EMI 6256 phototube operated at -1300 V and cooled to -10° C, was equipped with V and B filters matching the Johnson system. Each observation consisted of two separate 40-second integrations in the sequence VBBV through a 19" aperture or a 26" one on a few nights of poorer seeing. SAO 80583 was the comparison and SAO 80598 the check star for all observations. Our reported data (Figures 1 and 2) are in the instrumental B and V band system. These instrumental differential magnitudes (comparison-variable) are sufficient to model the geometrical starspot parameters; so, we did not convert to the Johnson UBV system. The open circles are the observed points in 1988; the filled squares, 1989. Statistical errors in a single set of data were rarely greater than 0.01 mag, with most between 0.005 and 0.008 mag. Both years are plotted on the same scale so that the distortion wave changes are readily apparent. Clearly, the distortion wave has migrated to increasing longitude between 1988 and 1989.

Using the technique of Budding and Zeilik (1987), we optimized fits to the observed data to extract the distortion wave. Figures 3 and 4 show the binary model fits (solid lines) at V-band for unspotted stars; the open circles are the data transformed to normalized

WY Cnc B-band Instrumental Magnitudes  
Laguna 1988 and 1989

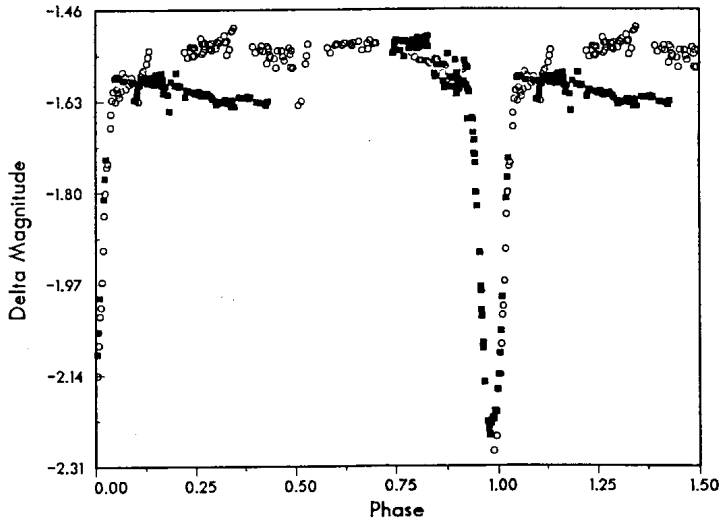


Figure 1

WY Cnc V-Band Instrumental Magnitudes  
Laguna 1988 and 1989

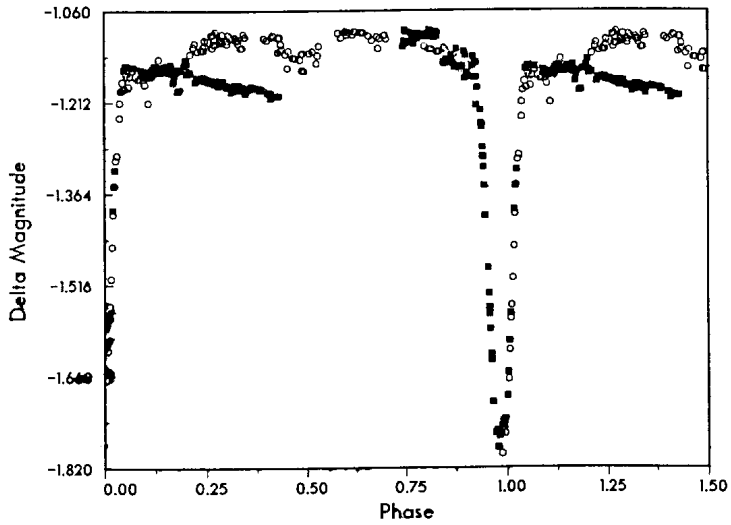


Figure 2

WY Cnc V-band  
Laguna 1988

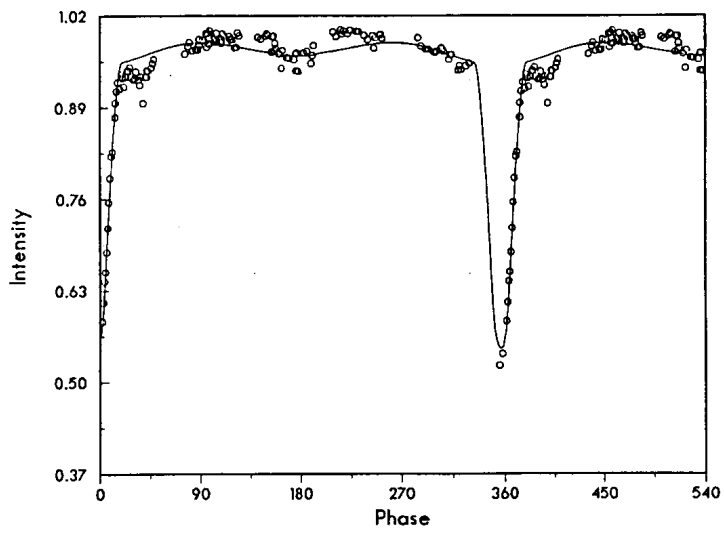


Figure 3

WY Cnc V-band  
Laguna 1989

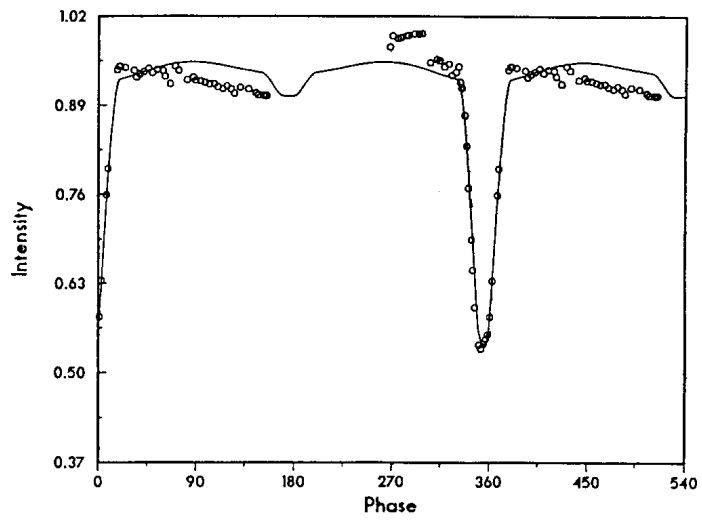


Figure 4

intensity units. Though the 1989 data are sparser than 1988, we still were able to extract a distortion wave. We then calculated optimized solutions for a black ( $T = 0$  K), circular spotted region to account for the maculation effects. The results were:

	1988	1988	1989	1989
	V-band	B-band	V-band	B-band
Longitude	$36.2^\circ \pm 4.0^\circ$	$35.7^\circ \pm 4.8^\circ$	$115.7^\circ \pm 3.4^\circ$	$105^\circ \pm 2^\circ$
Latitude	$0^\circ$	$0^\circ$	$0^\circ$	$0^\circ$
Radius	$8.0^\circ \pm 0.3^\circ$	$6.9^\circ \pm 0.4^\circ$	$12.5^\circ \pm 0.4^\circ$	$13.3^\circ \pm 0.7^\circ$

We were not able to find determinate solutions for the latitude; however, the  $\chi^2$ -minimized values indicate a low latitude for the spotted regions. So we set the latitude equal to  $0^\circ$  for each fit. We note that, despite the incomplete light curve in 1989, we were still able to extract most of the distortion wave and generate a good fit. We can compare the spot parameters derived here to those of Zeilik *et al.* (1989), who completed a light curve at V-band. Their 1989 data results in a longitude of  $107.7^\circ \pm 2.6^\circ$  and a radius of  $11.7^\circ \pm 2.4^\circ$ ; within the formal errors, the parameters are the same. The active region has migrated about  $80^\circ$  and increased in area a little more than a factor of 2 from 1988 to 1989. The B-band observations give essentially the same results.

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