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VARIABILITY OF W CYGNI

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One of the more readily observable semiregular variable stars is W Cygni (R.A. 21^h36^m, decl. $+45°22^m$ [2000]). W Cyg is an ideal star for a beginning astronomy class in the northern hemisphere to monitor because it has both a high northern declination and several nearby comparison stars. One difficulty, however, is that there are several different reported periods and magnitude ranges for W Cyg; in some cases, the magnitudes correspond to the blue instead of to the visual.

Over 26,000 visual magnitude estimates of W Cyg were submitted to the American Association of Variable Star Observers (AAVSO) by observers around the world between JD 2440000 (mid-1968) and JD 2450000 (late 1995). These data from the AAVSO International Database were sent to the authors by J. A. Mattei (1996a) in the form of magnitude versus JD plots, with each plot covering 1000 days of data, and serve as the basis for this paper.

All three authors (two of whom are professors of chemistry/astronomy (RS) and physics (RG), and the third (MK) is a sophomore math major) independently estimated the time of maximum brightness visually from the plots. In the analysis it was assumed that W Cyg had one period of variability. This assumption greatly simplified the analysis. A graphical method of analysis was utilized in this study because of its simplicity. (A Fourier analysis would be beyond the scope of a beginning astronomy class.)

The average period and standard deviation for each author is listed in Table 1. The equally weighted average period in days is 141.4 ± 8.0 or 141 ± 8. The uncertainty (U) is determined from

$$U = 2\sigma/(\sqrt{N}), \qquad (1)$$

where σ is the equally weighted average standard deviation and N is the average number of maxima found by the authors (70).

At each maximum and minimum, the average visual magnitude of W Cyg was

Table 1. Results for W Cyg from each author.

Author	*Period* [σ]	*Magnitude Range*	
		Average	*Extremes*
RS	$139^d.5$ [32.3]	5.9–6.6	5.4–7.0
RG	$145^d.9$ [36.3]	——	——
MK	$138^d.7$ [31.9]	——	——

estimated. The extreme magnitudes were 5.4 at maximum and 7.0 at minimum. The average value of the maximum magnitude was 6.6. The range in magnitudes reported here (5.4 to 7.0) is similar to previously published ranges (e.g., 6.80–8.9 B, in Kholopov *et al.* 1985; 5.0–7.6 visual, in Burnham 1978).

One of the authors (RS) monitored the brightness of this star over several months. The change in brightness is quite obvious and so this star is suitable for a beginning astronomy class. Since the period is between four and five months long, the student should study this star for at least three months. An evening observer should begin studying this star in August, while the pre-dawn observer would want to begin observing in February.

The authors are carrying out a more rigorous analysis of the behavior of W Cyg, using the observations subsequently provided by Mattei (1996b) in electronic form.

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References

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TECHNIQUES FOR CCD PHOTOMETRY OF SUPERHUMPS DURING SUPEROUTBURSTS OF DWARF NOVAE

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The study of outbursts of CV's to derive light curves and determine the periods of outbursts is an emerging AAVSO activity. Very high resolution and low noise are important. Some lessons learned on AL Com and V1159 Ori are shared.

CATACLYSMIC VARIABLE ECLIPSES

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Valuable information on the physical nature of cataclysmic variable stars can be obtained from those systems that exhibit eclipses. Observations of some eclipsing systems are presented.