COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 3252

Konkoly Observatory
Budapest
20 October 1988
HU ISSN 0374-0676

SLOW VARIABILITY OF V1500 Cyg

Regular photometric observations of Nova Cygni 1975 (V1500 Cyg) have been continued in the Crimean Observatory from 1975 up to now. The 0.5 meter meniscus telescope equipped with a TV system is used to get estimates of the brightness close to the V photometric band. The large amount of data obtained so far (2150 points) makes it possible to use statistical methods for searching for possible regularities in the light curve of V1500 Cyg in addition to the well-known main period $P_0=0^d.13961325$ (the corresponding phase dispersion spectrum is displayed in Figure 1).

We used the classical method of least squares approximation to obtain parameter estimates for polynomial trend (taking into account the fading of Nova) and harmonic components of the main period. After that we computed O-C residuals from the estimated model. In Figure 2 low resolution phase dispersion spectrum of residuals is plotted against frequency. The strongest minimum in the region under study (P=5-20 days) corresponds to $P_1=7^d.70$. However, the refined spectrum for the region around P_1 (Figure 3) shows several peaks ($P_1=7^d.7019$, $P_2=7^d.7352$, $P_3=7^d.7731$ etc.) and consequently we cannot speak about the feature around $P=7^d.70$ as the strict period.

G. Schmidt and H.S. Stockman (IAU Circ. No.4458) studied the polarization of V1500 Cyg and found that polarization is variable with the period of $P_{pol}=0^d.1376$. Within the range of permissible errors the following near equality holds:

$$P_{pol}^{-1}=P_0^{-1}+P_1^{-1}$$

and it cannot be ruled out that P_1 is the "beat" period between P_{pol} and P_0.

If P_{pol} is the period of rotation for the white dwarf (as was conjectured by G. Schmidt and H.S. Stockman) and P_0 is the period of its revolution in the system, then P_{pol} must synchronize with P_0 in the future and the period P_1 must change as well. Then the appearance of fine phase dispersion spectra can be attributed to the interplay between the changing nature of P_1 and random distribution of observations in time.

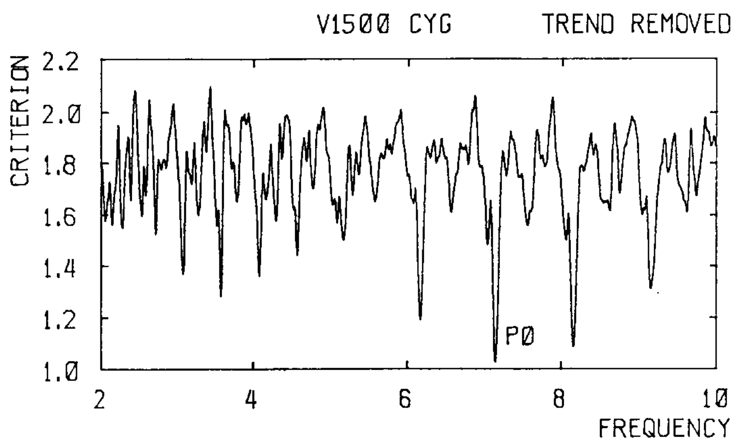

Figure 1: Crude PDM spectrum for detrended data.

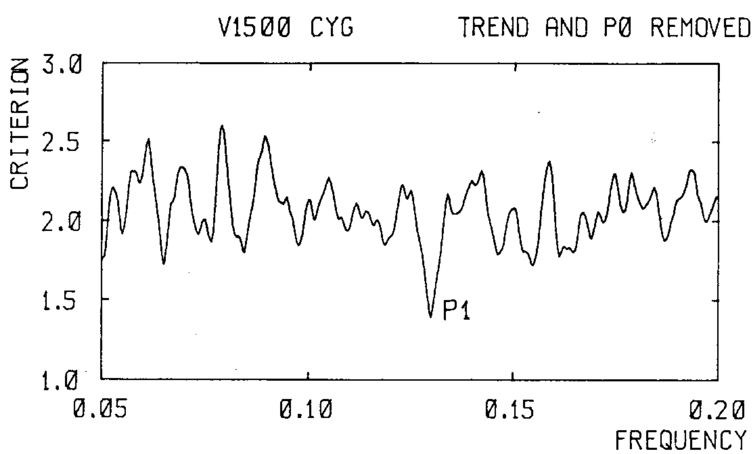

Figure 2: Crude PDM spectrum for O-C residuals.

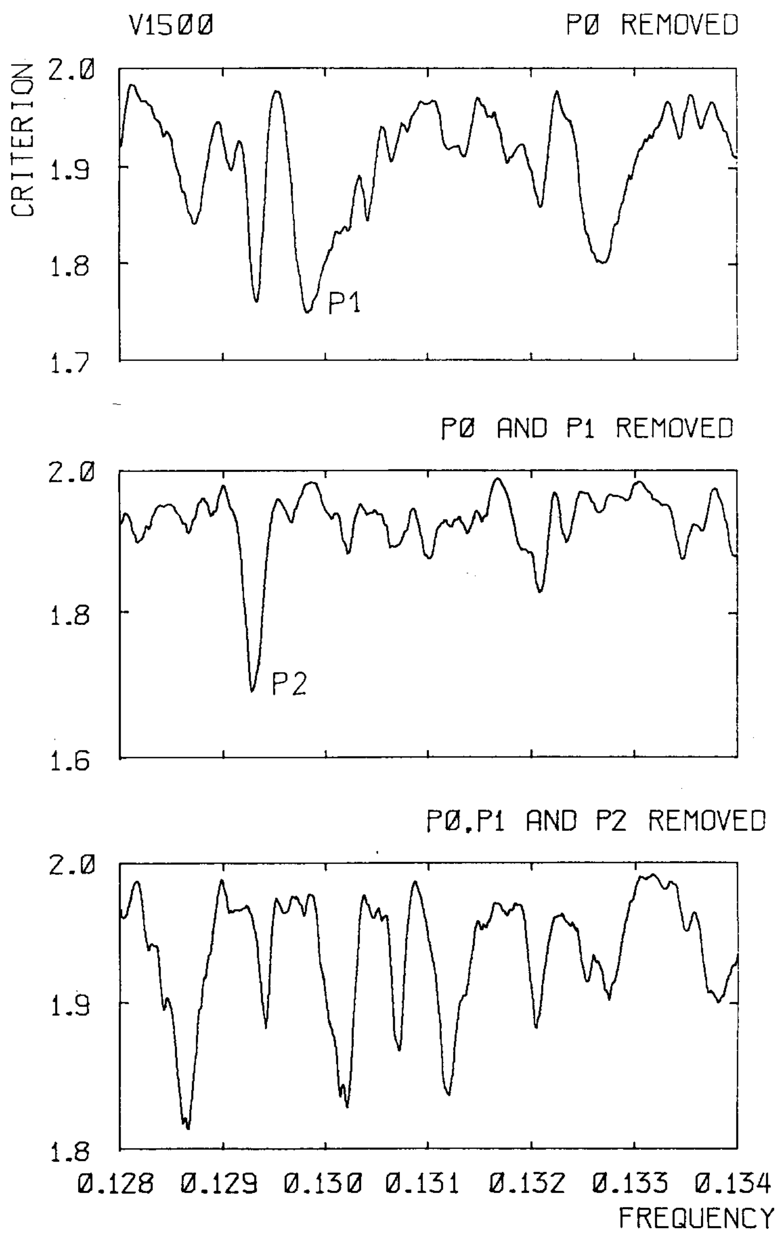

Figure 3: Refined PDM spectra for O-C residuals, sequential analysis

Evaluation of statistical significance for the obtained results is rather cumbersome because of the complex nature of V1500 Cyg variability. The development of appropriate statistical techniques is currently under way at Tartu Astrophysical Observatory.

Further photometric and polarimetric observations with substantial time base can reveal more exactly the nature of slow variability of this interesting object.

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