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

Number 1928

Konkoly Observatory
Budapest
1981 February 26

HU ISSN 0374-0676

HD 178450: A NEW RS CVn VARIABLE

The G6 V spectrum of $8^m.1$ HD 178450 displays strong Ca II H & K emission lines (Joy and Wilson 1949) and variable radial velocity (Wilson and Joy 1950). Fekel (1980), who is observing HD 178450 to determine its spectroscopic orbital elements, suggests it as a good candidate for RS CVn-type optical variability.

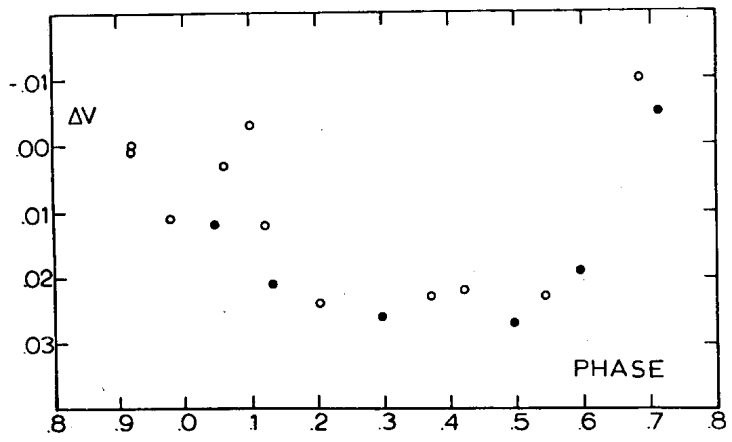
HD 178450 was observed photometrically between JD 2444506 and 2444513 with the No. 4 0.4-meter telescope at Kitt Peak National Observatory and between JD 2444526 and 2444569 with the 0.6-meter telescope at Dyer Observatory. BD $+31^\circ 3457$ was used as the comparison star. Means of the three individual differential magnitudes obtained each night are shown in the table, where Δ is in the sense variable minus comparison. The observations have been corrected for differential atmospheric extinction and transformed to the standard UBV system. The

Hel. J.D. (2,444,500+)	Phase	ΔV	ΔB
06.6490	$0^p.2970$	$0^m.026$	$-0^m.207$
09.7431	.7131	-0.005	
10.6632	.1342	0.021	-0.217
11.6727	.5962	0.019	
12.6400	.0389	0.012	-0.218
13.6448	.4988	0.027	
26.5868	.4219	0.022	
35.5967	.5454	0.023	
36.5459	.9798	0.011	
38.6025	.9211	0.001	
45.5476	.0996	-0.003	
49.5298	.9221	0.000	
50.5104	.3709	0.023	
54.5178	.2049	0.024	
55.5667	.6850	-0.010	
56.5194	.1210	0.012	
69.4993	0.0615	0.003	

standard deviation of the individual nightly magnitudes was usually $\pm 0^m.005$. Phases were computed with the ephemeris

$$JD(hel.) = 2{,}444{,}506.0 + 2^d.185\ E,$$

where the epoch is arbitrary and the period is the photometric period as determined below.



The nightly means in V are plotted in the figure with filled circles for Kitt Peak and open circles for Dyer. The photometric period was determined by fitting the data with the truncated Fourier series

$$\ell = A_o + A_1\cos\theta + A_2\cos 2\theta + B_1\sin\theta,$$

varying the period (and thus recomputing the phases) until the smallest errors in the coefficients resulted. The period which best fit the data was $2^d.185$ with an estimated uncertainty of $\pm 0^d.005$. The sine curve resulting from the use of this period had an amplitude (maximum to minimum) of $\Delta V = 0^m.033 \pm 0^m.005$ and a minimum at $0^p.348 \pm 0^p.024$, which would correspond to JD 2,444,506.76 $\pm 0^d.05$.

The light curve is only approximately sinusoidal and suggests some cycle-to-cycle changes in shape. These changes in the light curve, along with the small amplitude of the variation, may imply an uncertainty in the period larger than estimated above from the Fourier coefficients. In fact, the variation may not even be strictly periodic. More nearly continuous photometry over fewer cycles would be needed to define the shape of the light curve more accurately.

The author acknowledges that this work was supported in part by N.A.S.A. research grant NSG-7543.

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*Guest Investigator, Kitt Peak National Observatory, which is operated by the Association of Universities for Research in Astronomy, under contract with the National Science Foundation.