

THE ECLIPSING VARIABLE NSV 13826INTRODUCTION

NSV 13826 Peg (= HV 06152 = P 5616) (21h 39min 28s + 23° 01,5') (2000) was first mentioned as variable in a list published by H. Shapley and E.M. Hughes (1934). It was confirmed as variable by H.U. Sandig (1950) who detected irregular variations of the star between 12.6 and 13.3 (p) on 134 photographic plates from 1928 to 1939.

VISUAL OBSERVATIONS

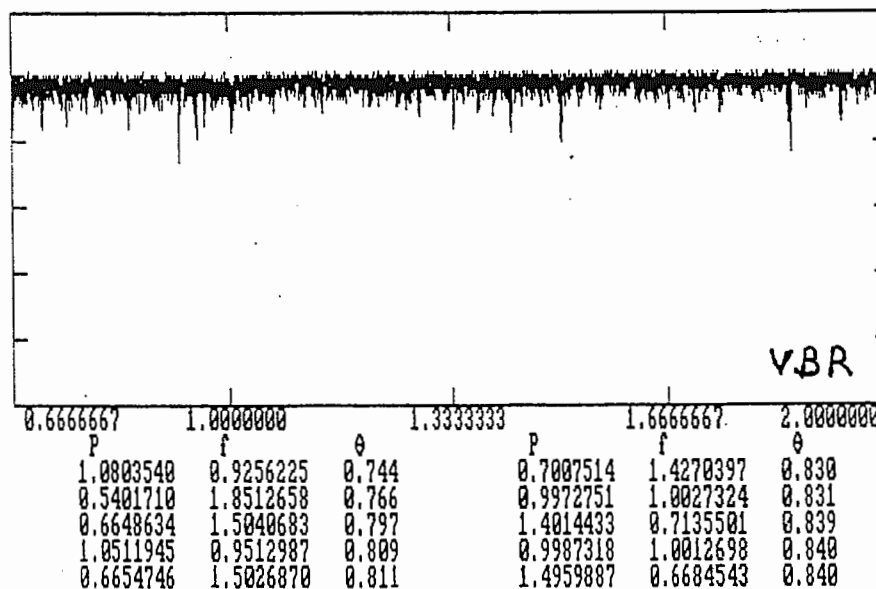
I began to observe NSV 13826 in September 1992 and presented the results of two years visual observations at the 1994 GEOS symposium, where the star was introduced in the priority programme of the group. Today, we have gathered 1057 estimates of the following observers : Vandebroere, Jacqueline (VBR) : 562 (92-96) ; Dalmazio, Davide (DDL) : 306 (95) ; Manna, Andrea (MAA) : 65 (95) ; Checcucci, Mario (CHC) : 73 (94-95) ; Verrot, Jean-Paul (VRR) : 41 (95) ; Dumont, Michel (DMT) : 6 (95) and Paris, Bernard (PAR) : 4 (95).

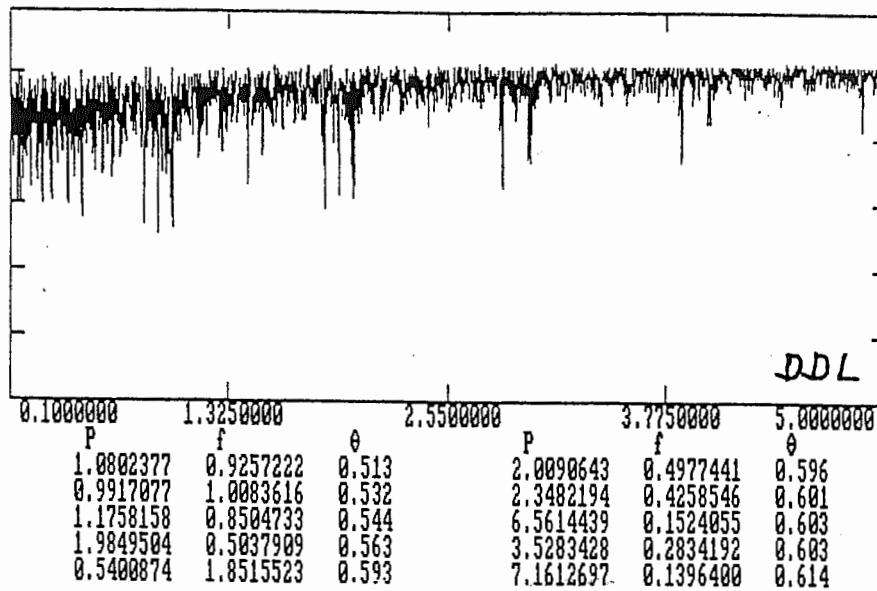
PERIOD RESEARCH

From the beginning, NSV 13826 seemed to me a real variable but rather irregular. Nevertheless, PDM period searches on my two first seasons of estimates showed several possibilities, with periods appearing in the two observation sets. But the results of 1994 seemed different and did not help me to find a solution to the star's variations.

It is only after 1995 that the period of NSV 13826 became evident. The PDM periodogram obtained with the 306 estimates of DDL and the one with the 186 estimates of VBR showed obviously the same period and the half one. Confirmation came from the estimates of other GEOS members and from the whole set of VBR estimates (see fig 1). Since 1992, NSV 13826 is regularly varying with a period of 1.080 days.

fig 1 : PDM periodograms from VBR and DDL estimates





The first ephemeris of NSV 13826 Peg was determined by the mean light curve composited with the more probable period appearing with my 562 estimates :

$$JD \text{ hel } 49566.3612 + 1.0803047 \text{ d} \times E \text{ (1)}$$

The following step was the determination of individual instants of minima ( see list 1).

list 1 : visual minima of NSV 13826

OBSERV.	HJD 2400000 +	E (1)	O-C (1)	E (2)	O-C (2)
VBR	49638.3104	66.5	+ 0.1089	0.5	+ 0.0714
VBR	49640.3381	68.5	- 0.0240	2.5	- 0.0614
VBR	49644.2781	72	+ 0.1350	6	+ 0.0979
VBR	49653.3692	80.5	+ 0.0435	14.5	+ 0.0071
VBR	49654.3038	81.5	- 0.1022	15.5	- 0.1385
VBR	49658.2313	85	+ 0.0442	19	+ 0.0082
VBR	49665.2377	91.5	+ 0.0286	25.5	- 0.0068
VBR	49930.4827	337	+ 0.0588	271	+ 0.0445
DDL	49948.3290	353.5	+ 0.0801	287.5	+ 0.0672
VBR	49964.4506	368.5	- 0.0029	302.5	- 0.0145
DDL	49997.3718	399	- 0.0310	333	- 0.0399
DDL	50003.2910	404.5	- 0.0535	338.5	- 0.0619
DDL	50008.2553	409	+ 0.0495	343	+ 0.0414
DDL	50010.3176	411	- 0.0488	345	- 0.0568
MAA	50011.4808	412	+ 0.0341	346	+ 0.0262
DDL	50028.2622	427.5	+ 0.0707	361.5	+ 0.0642
DDL	50043.2728	441.5	- 0.0429	375.5	- 0.0482

A linear regression with the instants of list 1 gave ephemeris (2) :

$$\text{JD hel } 49637.699 + 1.08022 \text{ d} \times \text{E} (2)$$

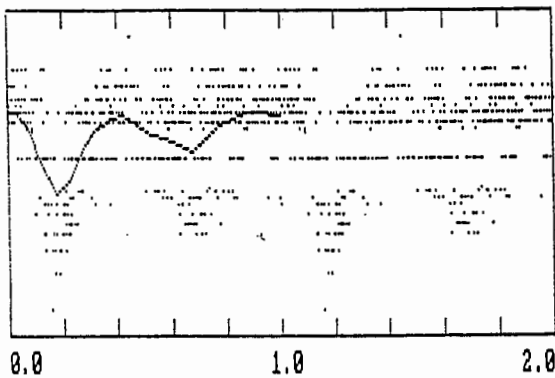
$$\pm 0.033 \pm 0.00021$$

(confidence 95%)

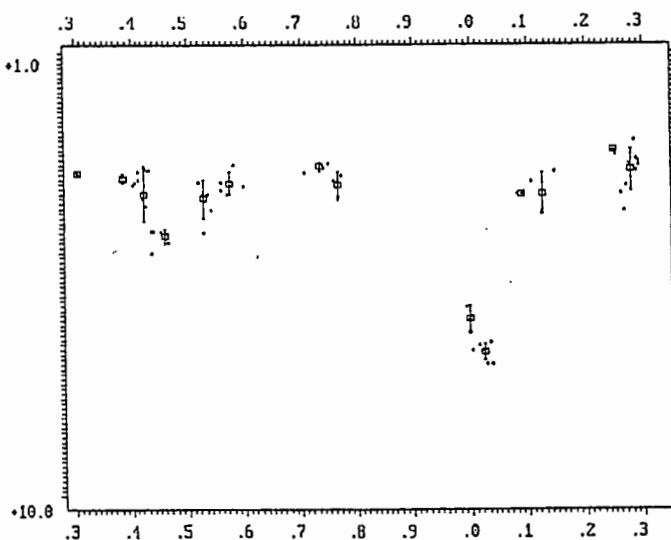
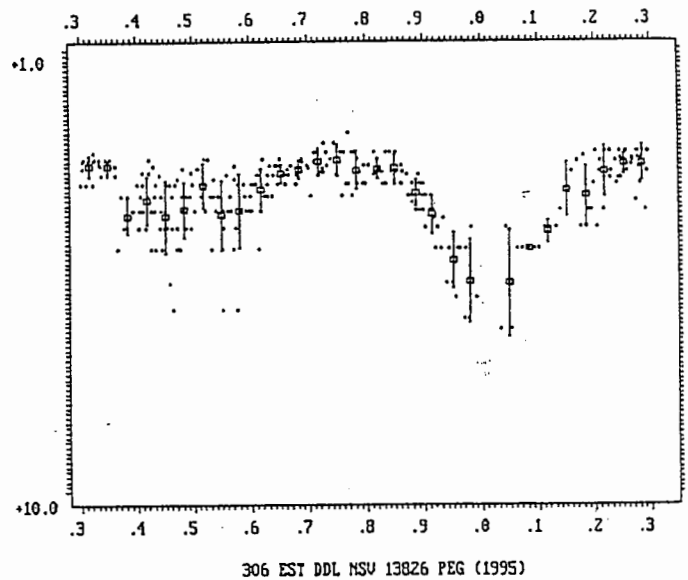
Ephemeris (2) has perhaps a lower accuracy than ephemeris (1), but further minima will easily improve it.

The shape of the light curve could not be definite with a great accuracy. The visual estimates were obtained by comparison with stars having perhaps very different colours. Nevertheless the EB type is apparent (see fig 2) and corresponds perfectly with the period and with the photoelectric measurements of the variable (see page 4).

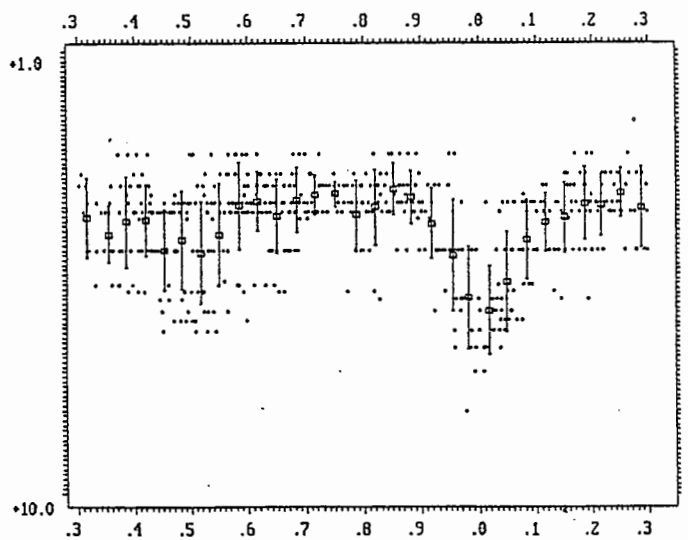
fig 2 : mean light curve using 562 visual estimates of the author and composite light curves with the different sets of estimates in my possession



C13826PE VBR  
 (10, 2), N = 562, ΔT = 1230.7117  
 P = 1.0803047 +/- 0.0000135, f = 0.9256648 +/- 0.0000115  
 Reduction of initial variance = 31.8%  
 Remaining standard deviation = 0.8187  
 False alarm probability = 1.26%  
 Mean amplitude = 1.8163, M - m = 0.75  
 Epoch: Max = 49567.1715, min = 49566.3612



65 EST MAA NSU 13826 PEG (1995)



562 VBR EST NSU 13826 PEG (92-96)

PHOTOELECTRIC RESULTS

Three photoelectric measurements of NSV 13826 were obtained using the B and V filters of the Geneva system with the 76-cm telescope of the Jungfrauoch observatory (see list 2).

list 2 : photoelectric measurements

HJD 2400000 +	mag (V)	(B-V)G	phases
49722.279	10.18	- 0.56	0.328
49946.600	10.48	- 0.51	0.974
49950.605	10.17	- 0.53	0.681

These values are in good agreement with the results of the visual observations. The colour indices correspond approximatively to an A spectrum classical for EB eclipsing stars.

CONCLUSIONS

NSV 13826 is probably an EB system for which period elements correspond to the following formula :  $JD_{hel} 49637.699 + 1.08022 d \times E (2)$ . More photoelectric measurements are required to cover the whole light curve. New visual minima would also be useful.

BIBLIOGRAPHY

- H. U. Sandig, 1950, *Astronomische Nachrichten*, 278, 181-190  
H. Shapley and E.M. Hughes, 1934, *Annals of the Astronomical Observatory of Havard College*, 90, 4°, 163-175  
P.N. Kholopov et al., 1982, *New Catalogue of Suspected Variable Stars*

Jacqueline Vandenbroere