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THE 1986 OBSERVATIONS AND THE PERIOD STUDY OF CN ANDROMEDAE

The light variability of the short-period eclipsing binary CN And was firstly discovered by Hoffmeister(1949). On the basis of photographic data, Tsesevich(1956) classified the system as an Algol-type and derived an orbital period of 2.599 days. Later, Löchel(1960) classified it as a W UMa-type system and determined the orbital period to be 0.462798 day. In 1972, Bozkurt et al.(1976) obtained asymmetric B,V light curves of the system. Although it was on the same point on the Period-Colour diagram with W UMa systems, Kaluzny(1983) observed the system in B and V colour in 1982 and suggested that the light curves of the system were similar to the ß Lyrae-type curves because of the difference in the depths of the minima. Yu-lan and Qing-yao(1985), in 1981 observations, observed two flare events.

The photoelectric observations were made with the 48 cm. Cassegrain telescope of Ege University Observatory equipped with an EMI 9781A photomultiplier, on the nights 8/9, 10/11 October, 25/26, 27/28 November, 1986. B and V filters, which are close to the standard UBV system, were used. BD +39°0065 and BD +39°0064 were used as comparison and check stars, respectively. The magnitude differences between the variable and the comparison stars in two colours were corrected for atmospheric extinction and the times of the individual observations were reduced to the Sun's centre.

Tsesevich(1956), who firstly made the photographic observations of CN And, found the light elements as,

$$\text{JD Hel. Min I} = 24\ 33913.386 + 2^{d}.2599 \cdot E. \qquad (1)$$

Löchel(1960) recalculated the light elements as,

$$\text{JD Hel. Min I} = 24\ 33570.465 + 0^{d}.462798 \cdot E. \qquad (2)$$

With the weight 0.1 assigned to the photographic minima and the weight 1.0 to the photoelectric minima, Kaluzny(1983) derived the linear fit to the O-C values as,

$$\text{JD Hel. Min I} = 24\ 45231.5215 \pm 21 + 0^{d}.46279477 \pm 10 \cdot E \qquad (3)$$

and, a quadratic fit as,

$$\text{JD Hel.Min I} = 24\ 45231.5216 \pm 50 + 0^{d}.46279661 \pm 51 \cdot E - 4.7\times10^{-11} \pm 1.3 \cdot E^{2}. \qquad (4)$$

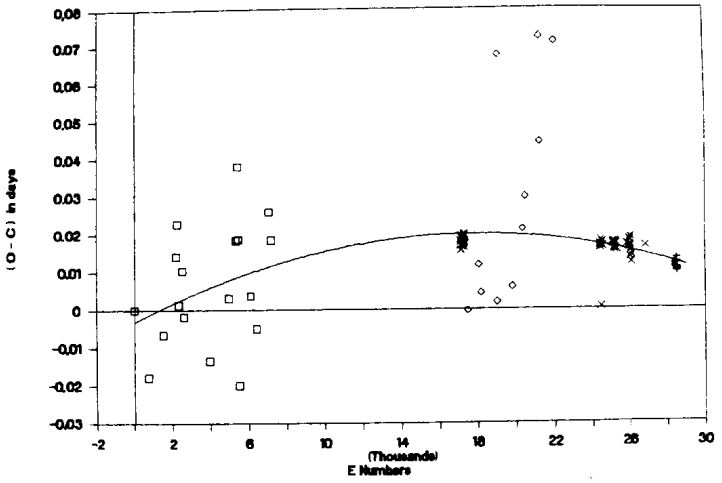

Figure 1. The O-C variation of CN And. □ , ◇ , × , and + refer to visual, photographic, photoelectric, and the present photoelectric observations, respectively.

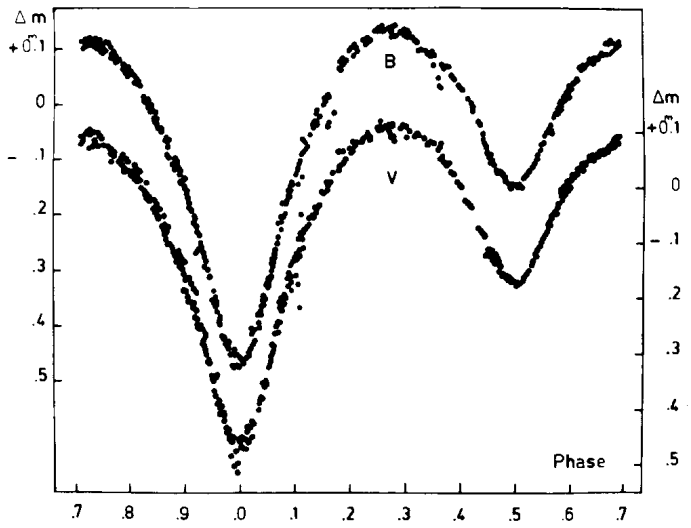

Figure 2. B and V light curves of CN And obtained in 1986.

According to this quadratic form, the period is decreasing.

In this study, we collected 71 minimum times and added to these our 6 MinI and 4 MinII times given in Table I. We used the epoch 24 33570.465 given by Löchel(1960), the period 0.46279475 day given by Michaels et al.(1984) and obtained the new light elements in a quadratic form as,

$$\text{JD Hel. Min I} = 24\ 33570.4618 \pm 25 + {}^{d}0.46279731 \pm 35 \cdot E - 7.1 \pm 1.1 \cdot E^{-11} \qquad (5)$$

Table I. Observed minima of CN And.

Minimum time	E	O-C(I)	O-C(II)
24 46712.4594	28397	$0^{d}.0118$	$-0^{d}.0004$
46712.4582	28397	0.0107	-0.0016
46714.3098	28401	0.0111	-0.0011
46714.3104	28401	0.0117	-0.0006
46760.3574	28500.5	0.0107	-0.0014
46760.3571	28500.5	0.0103	-0.0018
46762.2100	28504.5	0.0120	-0.0001
46762.2111	28504.5	0.0132	+0.0011
46762.4391	28505	0.0097	-0.0024
46762.4393	28505	0.0099	-0.0022

The theoretical curve for the period change which was calculated from the above equation, is given in Figure 1 with a solid curve. The weights of 1,2, and 3 are assigned to the visual, photographic and photoelectric minima, respectively.

Because of the decrease in the period of the system, an epoch was selected for the beginning of the observing season, and a period calculated from equation (5), and used for the phase calculation. Linear elements for this step are as follows:

$$\text{JD Hel. Min I} = 24\ 46711.5342 + {}^{d}0.46279321 \cdot E. \qquad (6)$$

The light curves are shown in Figure 2 where the magnitude differences between the variable star and the comparison star have been plotted against the phases calculated from the above equation.

Because of the depth of MinII is almost equal to half of the depth of MinI, and the similarity of the light curves to the ß Lyrae-type, the system can be classified as a ß Lyrae-type system. It can be seen that both maxima are shifted towards the phase 0.5.

The analysis of the light curves of the system is being in progress and the results will be published elsewhere.

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