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# V 577 Oph - AN ECLIPSING BINARY WITH A DELTA Sct TYPE PRIMARY COMPONENT

The eclipsing variable V 577 Oph = BD $+6^{\circ}3679$ was included in our observational program due to its considerable eccentricity e = 0.22 (Shugarov, 1985). The observations were carried out in Tian-Shan Observatory (altitude 3000 m) using a photoelectric photometer (EMI 9863) attached to the 19" reflector in 1987 - 1990. Three nearby stars were selected as comparison stars: BD $+6^{\circ}3678$ = "K" (prime standard), BD $+6^{\circ}3680$ = "C1", BD $+6^{\circ}3677$ = "C2". The differential observations were transformed to the WBVR system using HD 165401 standard star (Khaliullin et al., 1985). All observations were corrected for atmospheric extinction. The mean observational error in "V" is $\pm\ 0^{m}.005$. The comparison stars are constant within $\pm\ 0^{m}.008$ interval.

The pulsations were detected after previous processing of the photoelectric data. So we have undertaken special patroling of the star in quadratures. The analysis of all observations with our computer programs has revealed the presence of stable in 2.5 year interval period:

$$JDhel_{max} = 2447620.379 + 0^{d}.0694909 * E \quad \pm 3$$

Light curve in quadratures folded with this period is given in Figure 1. Observations in other filters are in good agreement with this value of the period. The amplitudes of light variation in different filters are: "W" - $0^{m}.055$, "B" - $0^{m}.070$, "V" - $0^{m}.052$, "R" - $0^{m}.040$. The amplitude is largest in "B" and decreases to "R". The pulsations just disappear in the primary minimum and have almost double amplitude in the secondary one. This indicates that the primary (brighter) component of the system is a delta Sct variable.

As the pulsations do not completely disappear in primary minimum, we have averaged all available points near mid-eclipse, where physical variability is less. Then we derived the individual moments of primary minima by fitting this mean curve to the observational points in computer memory. These moments are presented in Table I. The mean error is $\pm\ 0^{d}.0004$. The

Table I. Photoelectric times of primary minimum of V 577 Oph

| $JD_{hel}$ | E | O-C |
|---|---|---|
| 2400000.0 + | | |
| 47023.21267 | -63 | -0.00054 |
| 47272.4560 | -22 | 0.00035 |
| 47327.16767 | -13 | 0.00026 |
| 47345.40402 | -10 | -0.00064 |
| 47406.19552 | 0 | 0.00002 |

Table II. Mean magnitudes of the stars

| Star | V | B-V | W-B | B-R |
|---|---|---|---|---|
| K | 9.417 | 0.554 | 0.102 | 1.056 |
| C1 | 9.693 | 0.212 | 0.022 | 0.405 |
| C2 | 9.756 | 1.118 | 0.925 | 2.040 |
| V 577 Oph: | | | | |
| quadrature | 10.978 | 0.488 | 0.085 | 0.932 |
| Min I | 11.621 | 0.504 | 0.000 | 0.991 |
| Min II | 11.487 | 0.509 | 0.080 | 0.977 |

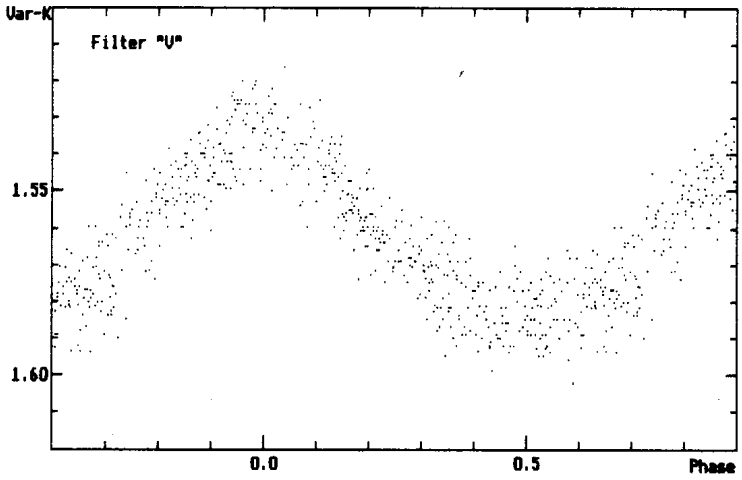


Figure 1. Light curve in quadratures of V577 Oph

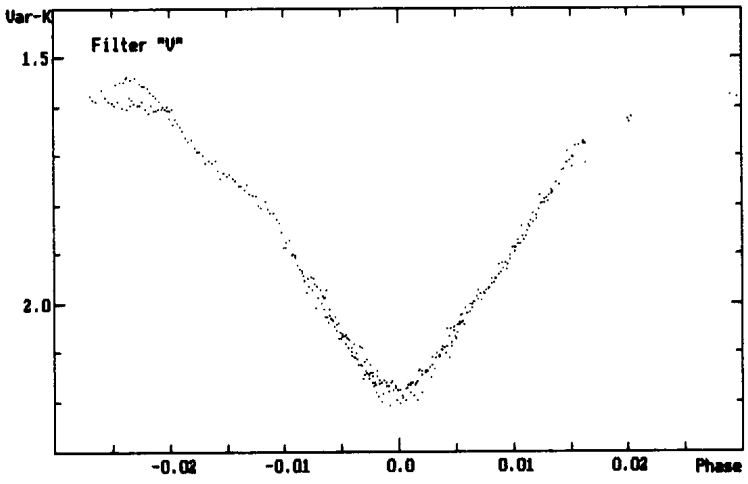


Figure 2. Primary minimum

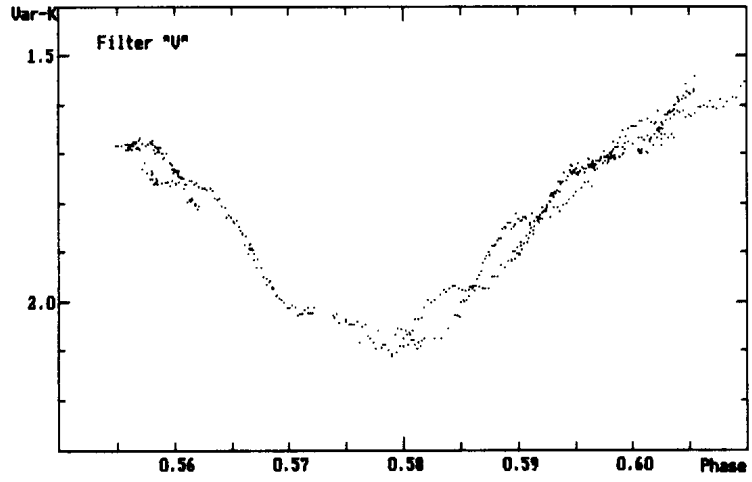


Figure 3. Secondary minimum

following formula for primary minima was obtained from this Table, making use of the least-squares method:

$$\text{Min I} \quad JD_{hel} = 2447406.1955 \pm 2 + 6^{d}.079084 \pm 4 * E$$

The moments of the secondary minimum cannot be obtained precisely because of the significant distortion of the light curve in the minimum due to pulsations. The phase of this minimum derived from all our observations is $\phi = 0^{p}.578$. The durations of minima are: DI = $0^{p}.0468$, DII = $0^{p}.0538$. Assuming $i = 90^{o}$ we can estimate the eccentricity $e = 0.14$ and $\omega = 29^{o}.6$. Both minima are presented in Figures 2 and 3. Mean magnitudes and colours of the variable in quadratures and in minima and those of comparison stars are presented in Table II. It is interesting to note that the variable becomes redder in both minima. So one can suppose a faint red companion not farther than 6" from the main components (third body?), as the angular diameter of diaphragm in use was 12".

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