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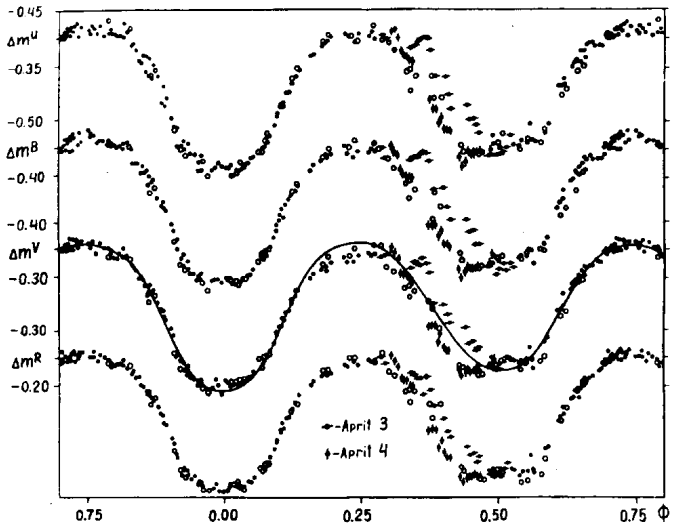
THE LIGHT VARIATION AND ORBITAL ELEMENTS OF AW UMa

1. The eclipsing system AW UMa has been observed through U, B, V and R filters from 1979 Aptil 1 - 4 to 1979 May 4 - 6 using the 20 inch reflector of Urals University Observatory.The comparison star was BD $+30^{\circ}2270$. A total of 239 observations in each filter were obtained. The extinction coefficient for each filter was determined from the comparison star observations on each night and all the observations have been corrected for atmospheric extinction. The mean errors of a single Δm = m(var.)-m(comp.) were calculated: $0^{m}.009$; $0^{m}.009$; $0^{m}.007$ and $0^{m}.006$ in U, B, V and R, respectively. Epoch of primary minimum (determined by the method of Pogson) is J.D.hel= 2443966.3420. No significant difference was found between the times of minima determined from the U, B, V and R light curves. The O-C = -0.0097 has been computed with the ephemeris by Dworak and Kurpinska (1975). The phases, calculated from this ephemeris, were corrected by addition 0.0220 (what corresponds O - C =-0.00965). This value is arithmetical mean from April series and May series of the Min 1 observations. It is a very large value in comparison with O-C from the paper of Dworak and Kurpinska and it shows a change of the period. The individual observations are shown in Fig. 1 (dots represent April dates and circles denote May dates). All four wavelength regions show the difference in the heights of the maxima of the light curves. Large differences from observations April 3 and April 4 were obtained for the phase interval 0.30 - 0.50. It is interesting that Dworak and Kurpinska obtained the deviation of their own light curves from Paczynski's curve in the phase interval 0.25-0.45. The polarimetric observations (Oshchepkov, 1974) shows the dependence of the observed polarization degree on the phase in the same



phase interval. All these effects show the existence of non-stationary processes in this close binary system.

2. One of the authors (L.F. Istomin) derived the orbital elements of AW UMa from the yellow light curve by the method of Russell and Merrill (1952) and by the method of differential correction of Irwin (1947). Zero-point correction of $-0^{m}.36$ has been applied. The phase interval 0.67-0.83 was taken for the determination of the constants of rectification, because at maximum light at phase 0.25 a depression of light and large distortion of the descending branch of the secondary minimum have been observed. The final rectification in intensity then carried out as follow:

$$l_r = \frac{1 + 0.0145 + 0.0138 \cos^2\theta}{1.0153 - 0.1203 \cos^2\theta}$$

The term in the reflection effect A_1=+0.0013 ± 0.0027 was discount. Constant term and the term $\cos^2\theta$ were obtained from preliminary studies. For a limb-darkening coefficient of 0.6 the rectification of the phase was made with z = 0.1153. The differential corrections for orbital elements a_1, a_2 and i were found by using the complete descending branch and a part of the ascending branch (0.05-0.14) of the primary minimum and the depth of the secondary minimum. The final results are: α_0^{tr}= 1.2228 α_0^{oc}= 1.0 k= 0.2850±0.0024 i=$79^{\circ}.0 \pm 1^{\circ}.1$ a_1=0.7059±0.0030 a_2=0.2012±0.0008

$b_1 = 0.6623$ $b_2 = 0.1888$ $L_1 = 0.94$ $L_2 = 0.06$ $J_1 = 1.27 J_2$.
In Fig. 1 the solid line is the theoretical light curve in V. Using b_1 and b_2 we find that the mass ratio $m_2/m_1 = 0.075$, and both components fill their Roche lobes (Plavec and Kratochvil, 1964).

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