COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 3540

Konkoly Observatory
Budapest
12 November 1990

HU ISSN 0374 - 0676

AW UMa IS IN ACTIVE PHASE OF MASS TRANSFER

AW UMa (BD+30°2163 = HD 099946), a totally eclipsing A-type W UMa system has attracted much attention in recent years (cf. e. g. Rensing, Mochnacki and Bolton 1985; Srivastava et al. 1989; Liu et al. 1990; In't Zand, Heintze, Van't Veer, 1990), because this system is of great interest in the study of the evolution of W UMa systems. It has smallest known mass ratio ($0.07 < q < 0.08$) among all binary stars. It exhibits probably the shallowest eclipses known for totally-eclipsing W UMa systems. It has very probably a space motion typical of an old disk population star (Eggen, 1967). Moreover, the system is easily observable because of its high apparent brightness ($V_{max} = 6^m.84$, $\Delta V = 0^m.24$). The system thus has been observed frequently, since its discovery in 1963 (Paczynski, 1964). It conforms very well to the overall properties of the A type contact systems: in addition to the small mass ratio, it has relatively early spectral type (F0-F2 by Paczynski 1964) and might have a rather large degree of contact (Hrivnak 1982). A variable O'Connell effect as slightly brighter primary or secondary maximum was reported by many observers (see e. g. Kalish 1965; Ferland and Mc Millan 1976, Hrivnak 1982). Although, there have been reported small light curve instabilities and one or two period changes (Dworak and Kurpinska 1975; Woodward et al. 1980; Srivastava and Padalia 1986) the system was known uncomplicated photometrically. In't Zand, Heintze, Van't Veer (1990) observed the system in 474, 579, 672, 781 and 871 nm wavelengths of the Utrecht Photometric System between 1983-1986. They found all the data lie within a band of about $0^m.06$ for each light curve indicating small seasonal variations.

In this short communication we report the strong light and color variations of AW UMa during the 1989 and 1990 observing seasons. We observed the system with UBV filters on five nights (20th and 21st February, 17th, 18th and 20th March) in 1989 and ten nights (7th, 8th, 11th, 12th, 13th, 14th January, 7th February, 6th, 8th and 12th March) in 1990. Differential observations with respect to the same comparison star BD +31°2270 as used by Srivastava and Padalia (1986) were secured by using an EMI 9789 QB photomultiplier attached to the 30 cm Maksutov

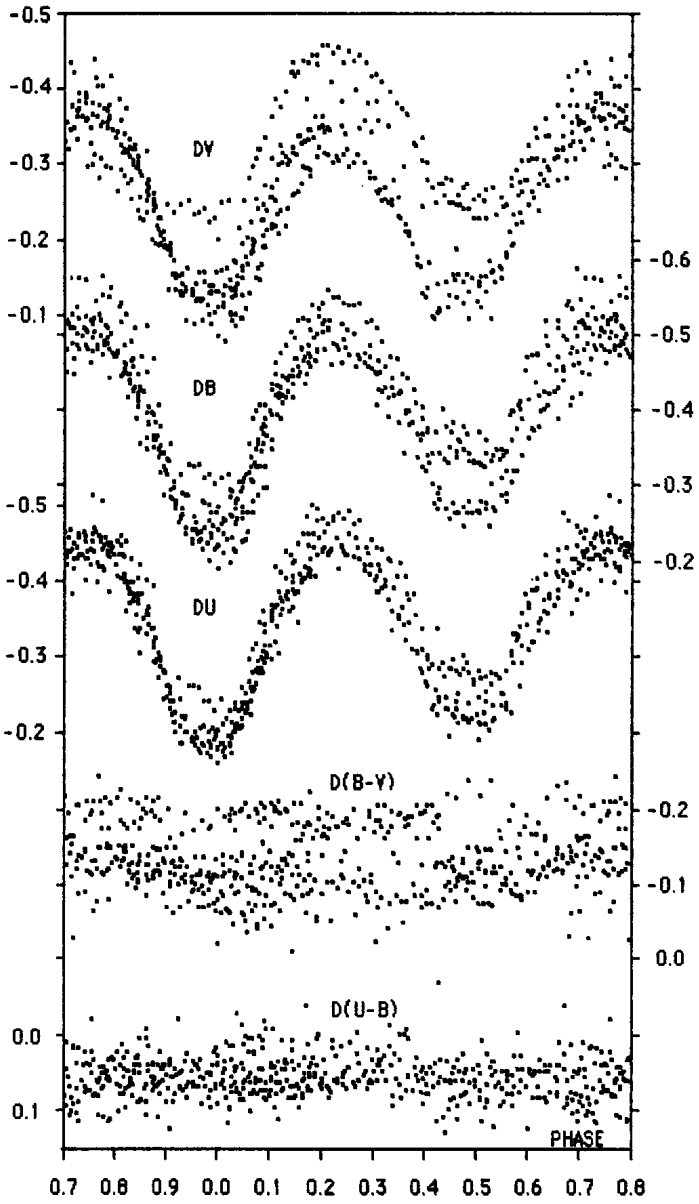

Figure 1. The light and color curves of AW UMa

telescope of Ankara University Observatory. Differential brightness measurements of the comparison with respect to the check star (BD +33°2123) in the sense that check minus comparison were found to be sensibly constant during the observations: $\Delta V = -0^m.025 \pm 0.030$, $\Delta B = -0^m.006 \pm 0.023$, and $\Delta U = -0^m.063 \pm 0.026$. The individual magnitude determinations were corrected for differential atmospheric extinction. The differential magnitudes ΔU, ΔB and ΔV, and differential color indices $\Delta(U-B)$ and $\Delta(B-V)$ in the sense variable minus comparison are plotted against phase in Figure 1.

Unusually strong light and color variations as large as $0^m.15$ in a few days time interval are displayed in Figure 1. The level and phase of maxima and minima, and thus depth of minima, all change irregularly in short time intervals. More important all such changes are seen stronger in longer wavelengths. The (B-V) index varies also more than twice in comparison to the variation of (U-B) index. A small asymmetry and small light curve and color instabilities as large as $0^m.04$ had been reported before (e. g. Hrivnak 1982, and Srivastava, Padalia 1986). No significant color variation has been noticed in the earlier observations by Paczynski (1964), Kalish (1965), Eggen (1967), Dworak and Kurpinska (1975). The large irregular variations we observed in short time intervals can not be explained only by the spot activity. We think the system entered an active phase of mass transfer in recent years, and such activity which is better seen in longer wavelengths increases in time.

It will be of great importance to obtain more systematic photoelectric observations of AW UMa, particularly in longer wavelengths to study the mass transfer activity in contact binaries.

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