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PHOTOELECTRIC PHOTOMETRY OF UX ARIETIS

The non-eclipsing RS CVn binary UX Ari (HD 21242) was observed by us during 1976, 1982 and 1983 using the 38-cm Grubb refractor of the Nizamiah Observatory with an uncooled EMI 9502B photomultiplier, GR 1230A DC amplifier and Honeywell Brown strip-chart recorder. Standard Johnson B, V filters were used. 62 Ari and HR 999 were used as comparison and check stars, respectively.

Figure 1 gives the observed light curves in the instrumental yellow system.

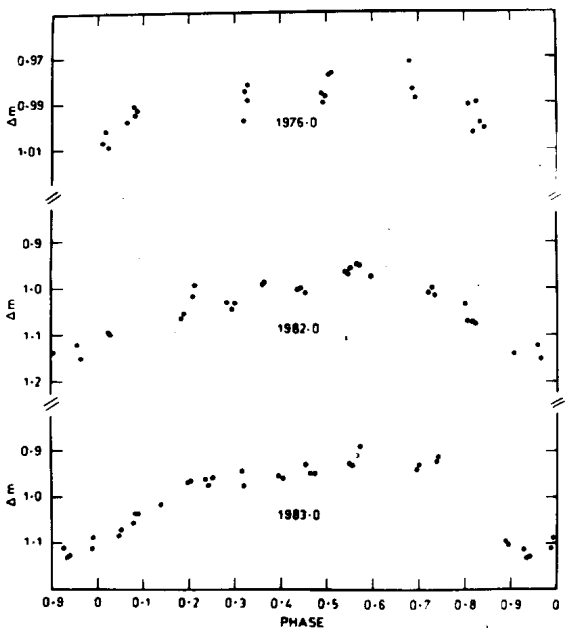

Figure 1

Plot of Δm (normal points) versus phase in instrumental yellow. The phases are calculated using the ephemeris HJD = 2440133.75 + 6.43791 E

The phases were computed using the following ephemeris given by Landis et al. (1978):

$$HJD = 2440133.75 + 6^{d}.43791\ E$$

The individual observations (about 200) in each year were Fourier analysed with the equation

$$\ell = A_o + A_1 \cos\theta + A_2 \cos 2\theta + B_1 \sin\Theta$$

The amplitude and the phase of minimum light (average of yellow and blue) for each year are given below:

Observing Epoch (year)	Phase	Amplitude (mag)
1976.0	0.0064 $\pm$ 0.004	0.02 $\pm$ 0.003
1982.0	0.004 $\pm$ 0.002	0.15 $\pm$ 0.004
1983.0	0.001 $\pm$ 0.002	0.15 $\pm$ 0.004

Zeilik et al. (1982) have reported that their observations of this system during fall-winter of 1981 give a value of 0.97 as the minimum phase and an amplitude of $0^{m}.21$ in yellow.

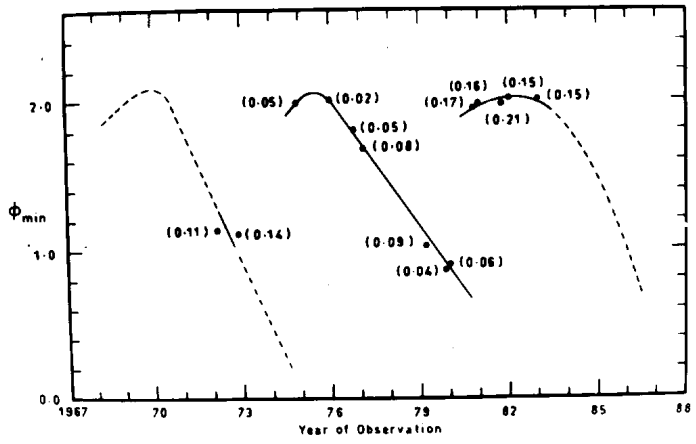

Figure 2

Plot of phase of light minimum versus year of observation. The bracketed number near each point indicates the amplitude of the wave during that year.

The phase and amplitude of the distortion wave in UX Ari has been reported to be undergoing an erratic behaviour during the past 10 years (Zeilik et al., 1982). Using the values of the epoch, phase of light minimum and amplitude published by Guinan et al. (1981), Zeilik et al. (1982) and our own values given above, a plot, the year of observation versus phase of light minimum, is shown in Figure 2. From this figure, it appears that the spot or spots on UX Ari which form first above the co-latitude, have a direct motion for sometime and then move in a retrograde direction after they migrate below the co-latitude and arrive near the star's equator. They disappear after sometime and a new spot cycle starts with the spots forming above the co-latitude again. We suggest a period of 5-6 years for one cycle. If this model is correct, the spots before 1975, between 1975-80 and 1981 onwards form three distinct cycles. There appears to be not much variation in the amplitude of a wave during a cycle suggesting that the nature of the spot or spots does not vary much in a cycle but differs from cycle to cycle.

We suggest that the behaviour of the distortion wave in UX Ari is not erratic but systematic. At present, the spot or spots seem to lie near the co-latitude and will migrate towards the equator thus leading to retrograde motion in the coming years. Further observations will shed more light on the above model.

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References:

Guinan, E.F., McCook, G.P., Pragola, J.L., O'Donnell, W.C., Weisenbergen, A.C., 1981, P.A.S.P. 93, 495
Landis, R.J., Lovell, L.P., Hall, D.S., Henry, G.W., Renner, T.R., 1978, A.J., 83, 176
Zeilik, M., Elston, R., Henson, G., Smith, P., 1982, I.B.V.S. No. 2168