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PHOTOMETRIC VARIABILITY OF HD81410 IN 1988*

The single - line chromospherically active spectroscopic binary HD 81410 has a relatively large orbital period P = 12.86833 days and its colors at the maximum light level correspond to a system with KO III primary and F5 V secondary (Raveendran et al., 1982). Bidelman and MacConnel (1973) detected strong emissions in Ca II H and K. Eggen's (1973) photometric observations of HD 81410 during 1971 and 1972 showed light variability with an amplitude of 0.50 mag and he estimated the period to be 25.4 days. The 1981 photometry by Raveendran et al. (1982) and their subsequent analysis of the photometry and spectroscopy, available till then, showed that the system has an orbital period of 12.86833 days and 12.89 days periodicity in light variation. The shape and the amplitude of light curve in 1981 was entirely different from that of 1971 and 1972. These variations are caused by the rotational modulation of magnetically active regions, spots, that are cooler than the surrounding photosphere. Slee et al. (1984) detected radio emission from HD 81410 at 5 GHz and also they observed flux variability by a factor of 2 in 90 minutes during a major flare of 1983 August 2.

HD 81410 was observed with the 50 cm telescope at the European Southern Observatory, La Silla, on 18 nights; 7 nights through UBVRI filters and a cooled RCA 31034 photomultiplier tube and 11 nights through Stroemgren uvby filters and a cooled EMI 6256 tube. The measurements were made differentially with respect to the comparison star HD 81904. Sufficient numbers of UBVRI and uvby standard stars were observed for the conversion of the instrumental magnitudes to the standard system. The mean error in V is of the order of 0.006 mag and in y 0.007 mag. The Stroemgren y is nearly the same as the Johnson V, and in order to compare both sets of observations, the y magnitudes were converted to Johnson V values using the relation

$$V = y + 0.015\,(b-y) - 0.003 \quad \text{(Olsen, 1983)}.$$

* Based on observations collected at the European Southern Observatory La Silla, Chile.

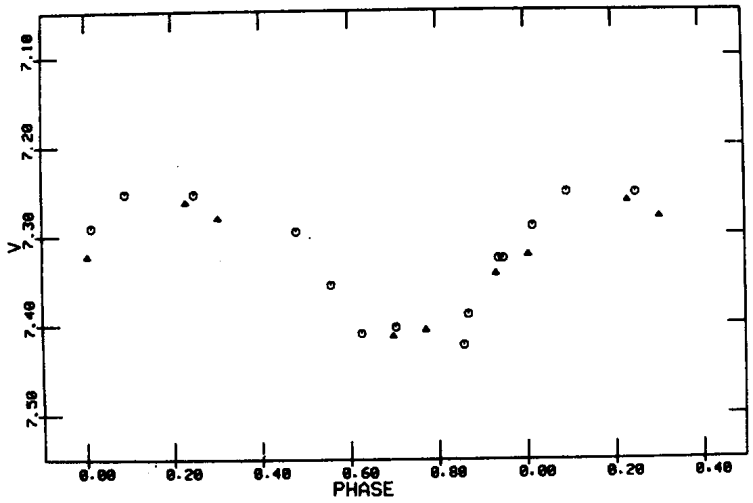

Figure 1

The orbital phases were calculated according to the ephemeris of Raveendran et al. (1982):

$$JD = 2441466.213 + 12^{d}.86833E$$

Figure 1 is a plot of V magnitudes. The rectangles represent V magnitudes of UBVRI photometry and open circles the calculated V values from Stroemgren y. The light curve is asymmetric with a flat minimum (0.60P to 0.85P) and has an amplitude of 0.16 mag. The magnitudes at the maximum and minimum are 7.25 mag and 7.41 mag respectively.

From the photometry of HD 81410 available in the literature, it is seen that the light curve during 1971/72 was quasi-sinusoidal with an amplitude of 0.45 mag, minimum at 0.70P and the maximum light level 7.50 mag. In 1981 the light curve had two minima and the maximum brightness.7.50 mag while the amplitude decreased to 0.15 mg. The unpublished observations obtained by Mekkaden during 1987 indicated that the light curve had two minima; the deeper minimum occurring at the same phase as that of the light curve in 1988. This means that the large spot group responsible for the deeper minimum in 1987 was present in 1988 while the small spot group of 1987 disappeared. The unchanged maximum light levels of these two seasons reveal that the activity on the less spotted hemisphere remained unchanged.

The changes in the light curve and the mean light level occur due to the formation and disintegration of active regions. Mekkaden and Geyer (1988)

interpreted such types of activity due to the evolution of short lived spot groups in active zones on stellar photosphere and the cumulative effect of these spot groups cause changes in the activity in these stars.

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