Abstract. In this work, $B$ and $V$ photometry of the RS CVn-type binary II Peg is presented. The light curves obtained in 1983 and 1984 display two unequal maxima. The light curves of the system have different amplitudes. The amplitude seems to vary with three different periods. 10, 6, and 4 years of periods may be attributed to those variations.

1. Introduction

II Peg (= HD 224085, BD +27°4642, SAO 091578) is an active, non-eclipsing RS CVn-type single-line spectroscopic system. Its photometric variability was first discovered by Chugainov (1976) who noted $V$-band variations of variable amplitude and tentatively classified the star as a BY Draconis-type variable. A subsequent detailed study of II Peg was presented by Rucinski (1977), who also noted the variability of the light curve. He has concluded that this star more closely resembles to a RS CVn system. The presence of a weak lithium line at $\lambda$6707 led Rucinski (1977) to suggest also that II Peg is in a late stage of pre-Main-Sequence evolution. However, Vogt (1979) reported high signal-to-noise observations of the $\lambda$6707 region which questioned the identification of Li I in this star. Later, Rodono et al. (1980) were considered the star as a transition prototype between RS CVn and BY Dra active stars. Hartmann et al. (1979) found that II Peg was essentially constant in magnitude for about 40 years until 1945–1950, when both short- and long-term variability set in. II Peg has been observed in $V$ to be as bright as +7.19 mag (Chugainov, 1976), and as faint as +7.78 mag (Vogt, 1981). The $V$-band light amplitude has ranged from 0.12 mag (Kaluzny, 1984) to 0.45 mag (Byrne, 1986).

Analyzing the available light curves obtained between 1974 and 1981, Rodono et al. (1983) determined that maximum and minimum light migrate towards decreasing orbital phases at different rates (0.23 and 0.03 period yr$^{-1}$, respectively), with light minimum and the orbital motion essentially synchronized. Furthermore, the system was observed photoelectrically by Nations and Ramsey (1981), Raveendran et al. (1981), Bohusz and Udalski (1981), Zeilik et al. (1982), Henry (1983), Lines et al. (1983), Hall and Henry (1983), Arevalo et al. (1985), Lazaro and Arevalo (1986), Wacker and Guinan (1986), Wacker et al. (1987), Cutispoto et al. (1987), Mekkaden (1987), Boyd et al. (1987).

Among these, in the 1979 observations of Nations and Ramsey (1981) the two unequal maxima separated by $\sim$0.55 in orbital phase are seen. These are interpreted in terms of the starspot model of RS CVn systems to give a temperature difference between the spots and the surrounding photosphere of $\Delta T = 1100 \pm 450$ K and a fraction of the visible disk covered by the spots of $\Delta A = 0.27 \pm 0.10$. Whereas, by 1980 Raveendran et al. (1981) noted only one peak (0.15 magn.) at phase 0.6. Bohusz and Udalski (1981)
suggested that the spot cycle of II Peg is about 8–10 years. In the system’s light curves obtained by Arevalo et al. (1985) two minima at about 0.26 and 0.97 phases with similar amplitude, approximately 0.15 mag are seen. These observations are markedly different from those previously reported by Zeilik et al. (1982), Hall and Henry (1983), Lines et al. (1983), and Henry (1983). Cutispoto et al. (1987) had found that the latitudes for the two spots are 58 and 9 degrees. The radii are 23 and 37 degrees, respectively. The two spots are 105 degrees apart in longitude. According to Mekkaden (1987), a decade of photometry of II Peg shows that the system is one of the most spot-active binaries exhibiting single or multiple spot groups at different latitudes and changes occur within a short time-scale.

In this paper, the distortions seen in the photoelectric light curves obtained in 1983 and 1984 are presented and the new spot cycles of the system are suggested.

2. Observations

All the observations reported here were carried out at Ege University Observatory on 30 nights between 19 July and 15 October, 1983 and on 17 nights between 18 July and 28 August, 1984. The 48 cm Cassegrain telescope, uncooled photometer equipped with an EMI 9781A photomultiplier was used. All observations were made with the B and V filters of the UBV system. BD + 28° 4666 was taken as comparison star. Nightly extinction coefficients were determined from the observations of the comparison star, and small differential extinction corrections were applied to the magnitude differences between the comparison and variable stars. The differential observations of II Peg are listed in Table I, where the first column indicates the heliocentric times and the second column orbital phases corresponding to these times. The orbital phases were calculated using the light elements given by Hall and Henry (1983) as

$$J.D. = 2443030.24 + 6.724183E.$$ 

The third and fourth column give the differential magnitudes in blue and yellow light in the sense comparison minus variable. The light curves of the system in B and V are shown in Figures 1(a) and 1(b) for 1983 and in Figures 2(a) and 2(b) for 1984.

3. Description of the Light Curves

Since II Peg is a very active system, its light curves change very rapidly even during one observing season. As can be seen from Figures 1(a) and 2(a), the observations were repeatedly made in different time intervals during one year. For example, we firstly observed the system on 10 nights between 19 July and 12 August, 1983 (hereafter referred as the first group of observations), later observations for that year were made on 9 nights between 29 August and 15 September (hereafter referred as the second group of observations) and on 11 nights between 22 September and 15 October (hereafter referred as the third group of observations). A similar observing program has