NEW TIMES OF THE MINIMA AND LIGHT ELEMENTS OF SW LACERTAE

A. ESSAM, H. A. MAHDY, and M. A. HAMDY

Helwan Institute of Astronomy and Geophysics, Cairo, Egypt

(Received 28 March, 1991)

Abstract. SW Lacertae is a short-period variable star of the W UMa-type. A total of 261 photoelectric observations for each U, B, and V filter were obtained in 1986 while 522 photoelectric observations for each B and V filter were obtained in 1987. All these observations were transformed to the U, B, and V colours of the UBV standard system. Nine light curves for primary and secondary eclipses were obtained, their times of minima were determined and a new linear ephemeris was obtained. The period changes of the system were also discussed.

1. Introduction

The eclipsing binary SW Lac was discovered by Miss Ashall on plates taken at the Harvard Observatory. Leavitt (1918) reported that the range of light variations in the primary minimum was 0.7 mag while that of the secondary minimum was not detectable. She also reported that in spite of the fact that this system changes its period, the values of 0.1603582 d could be suggested for it. Hertzsprung (1922) proposed that the period should be doubled. The change in the period of this system and the variations of its light curve, make it desirable to be observed. Many light curves were obtained from photographic, visual, and photoelectric observation. Serkowski (1953) found that the secondary minimum was slightly displaced from 0.5 phase and pointed out that this may be due to the eccentricity of the orbit.

The system was observed spectroscopically and orbital elements were derived by Struve (1949) from his radial velocity curve, with the assumption of circular orbit. Jameson and Akinç (1979) obtained an infrared light curve for this system.


2. Observations

The observations of the system SW Lac were obtained on 14 nights during the period from 1 to 14 July, 1986 and from 21 June to 1 August, 1987.

Star BD 37°4715 (which was used by all the previous observers of this system as a comparison star) was also chosen as a comparison star in the present work.

Phases of this system were calculated form the linear ephemeris (Niarchos, 1987) as

\[ \text{Hel. J.D. (Min. I) = } 2444499.5264 + 0.3207204E. \]
A total of 261 observations for each $U$, $B$, and $V$ filter were obtained in 1986 while 522 observations for each $B$ and $V$ filter were obtained in 1987. All these observations were transformed to the $U$, $B$, and $V$ colours of the $UBV$ standard system.

3. Results and Discussion

Nine light curves for primary and secondary eclipses were obtained and represented in Figures 1 to 9. While Figures 10 and 11 represent complete light curves of 1986 and 1987 observations, respectively. The deduced times of minima (Hel. J.D.) are listed in Table I together with the probable error, besides their O–C residuals, type of minima (Min.), filters, and integer cycles ($E$).

![Figure 1. Secondary minimum of SW Lac in $U$, $B$, and $V$ filters.](image)

4. Investigation of Period Changes

Most W UMa-type contact binaries show changes in their period, a fact which can be attributed to many factors.

The variations in the period of this system have been discussed by many investigators and consequently various assumptions have been made. The change in the period (Lafta and Grainger, 1985) may be interpreted as a consequence of the presence of a third body in the system or it may be due to mass-loss by one or both components caused by dynamical instability.