BULLETIN OF THE ASTRONOMICAL INSTITUTES OF THE NETHERLANDS

1953 AUGUST 3 VOLUME XII NUMBER 446

COMMUNICATIONS FROM THE OBSERVATORY AT LEIDEN

ON THE SHORT-PERIOD VARIABLE HD 223065

BY TH. WALRAVEN

The exceptionally interesting cepheid variable, HD 223065, which has the shortest known period, as was discovered by EGGEN [1]), was observed from July to October 1952 with the photo-electric wedge-photometer at the Leiden Southern Station.

The observations cover 101 cycles of light-variation, obtained on 21 nights. They were made in one colour, with as filter BG 1 (2 mm) + GG 13 (2 mm), which gives a colour response not far from photographic. The detailed study of the light-curves will take considerable time. The periods, however, have been determined already and it was thought in the interest of future observations to publish these in advance. The light-variation depends on two periods. The primary period, P_o, is found from the epochs of ascending branches as:

$$P_o = 0^d.05496420 \pm 0^d.00000005 \text{ (m.e.)}.$$

The variation of the amplitude of the light-curves gives the secondary period, P_b, for which is found:

$$P_b = 0^d.192836 \pm 0^d.000002 \text{ (m.e.)}.$$

This variation is caused by interference of two oscillations, with periods P_o and P_1, which are related to P_b by:

$$\frac{1}{P_b} = \frac{1}{P_1} - \frac{1}{P_o}. \qquad (1)$$

From (1) we derive:

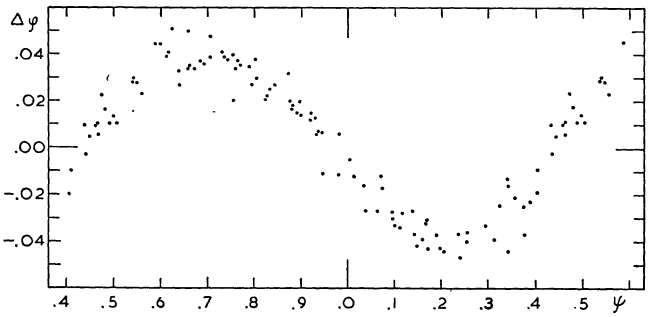
$$P_1 = 0^d.04277268.$$

The heliocentric Julian Day of the moments when the ascending branch reaches the median magnitude is given by:

$$\text{J.D.} = 2434200^d.0389 + 0^d.0549642\,(E + \Delta\varphi), \qquad (2)$$

where $\Delta\varphi$ is the periodic phase shift caused by the second period. In this case the median magnitude is defined as the magnitude which is crossed by the ascending and descending branches with a time difference of half a period.

FIGURE 1

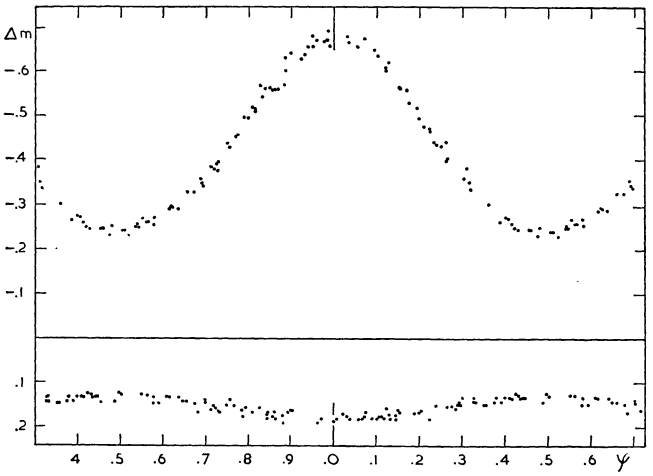


The phase shift $\Delta\varphi$ is given in Figure 1 as a function of ψ, the phase of the secondary period. Here ψ has been computed as:

$$\psi = (\text{J.D.} - 2434200.1039)\; 5^{d-1}.18575. \qquad (3)$$

How the amplitude of the light-curves varies during a secondary cycle is shown in Figure 2, where the

FIGURE 2



[1]) O. J. EGGEN, *P.A.S.P.* **64**, 31, 1952.

CONTENTS