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NEW PERIOD AND PERIOD CHANGE OF EU HYDRAE

The eclipsing binary EU Hya was observed with the photoelectric photometer attached to the 60 cm reflecting telescope in BV bands at Yunnan Observatory during February to March, 1991. HD 74332 and HD 74309 were used as comparison and check stars, respectively. From our observations three primary minimum times were determined, which are listed in Table 1 (the last three minima).

We have collected all minimum times which could be found to calculate the new ephemeris formula

$$\begin{array}{l}\text{Min.I}=\text{JD(hel.)}2448323.1732+0^{\text{d}}.77820650\times\text{E} \\ \qquad\qquad\qquad\quad \pm 27 \qquad\quad \pm 35\end{array} \tag{1}$$

by means of the least squares method. This ephemeris was used in calculating the (O−C)I values in the Table, using these (O−C)I values we derived the O−C diagram displayed in Figure 1. In Figure 1 a systematic trend is seen: the period became shorter continuously. In order to determine the rate of period change, all the minimum times were introduced into a quadratic least squares solution which resulted in:

$$\begin{array}{l}\text{MinI}=\text{JD(hel.)}2448323.1676+0^{\text{d}}.77820374\times\text{E}-1^{\text{d}}.99\times10^{-10}\times\text{E}^2 \\ \qquad\qquad\qquad\quad \pm 20 \qquad\quad \pm 50 \qquad \pm 32\end{array} \tag{2}$$

and the rate of period change: $dP/dE=-3^{\text{d}}.98\times10^{-10}$. With this ephemeris we computed the (O−C)II values in Table 1 which is shown in Figure 2. Comparing Figures 1 and 2 the quadratic ephemeris has smaller deviation than the linear one, this point could also be seen from the sums of weighted square of the deviations:

$$\sum_i W^2_{(O-C)I_i} = 0.0269, \quad \sum_i W^2_{(O-C)II_i} = 0.0118$$

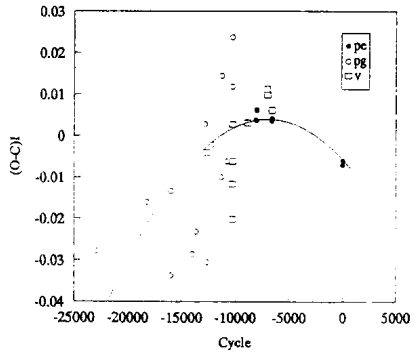

Figure 1. The O−C diagram of the linear ephemeris, the smooth curve represents the quadratic fit.

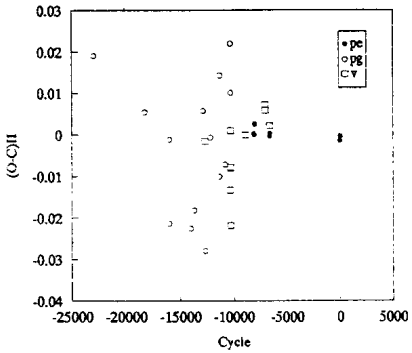

Figure 2. The O−C diagram of the quadratic ephemeris.

Table 1.

JD(Hel.)	E	(O−C)I	(O−C)II	Weight	Source
24000000+					
30470.3100	−22941	−0.0278	0.0190	3	K
34126.3360	−18243	−0.0160	0.0054	3	K
35862.4970	−16012	−0.0337	−0.0214	3	B
35876.5250	−15994	−0.0134	−0.0012	3	K
37403.3510	−14032	−0.0286	−0.0226	3	B
37669.5030	−13690	−0.0232	−0.0182	3	B
38321.6660	−12852	0.0028	0.0057	3	B
38449.2850	−12688	−0.0041	−0.0016	1	K
38473.3830	−12657	−0.0305	−0.0280	3	B
38852.3980	−12170	−0.0021	−0.0007	3	B
39507.6400	−11328	−0.0100	−0.0101	3	B
39536.4580	−11291	0.0144	0.0142	3	B
39915.4240	−10804	−0.0062	−0.0072	3	B
40290.5140	−10322	−0.0117	−0.0134	1	D
40319.3130	−10285	−0.0063	−0.0081	1	D
40319.3220	−10285	0.0027	0.0009	1	L
40319.3430	−10285	0.0237	0.0219	3	B
40322.4120	−10281	−0.0202	−0.0219	1	L
40322.4260	−10281	−0.0062	−0.0079	1	D
40326.3350	−10276	0.0118	0.0100	3	B
41410.3680	−8883	0.0031	−0.0001	1	P
42010.3660	−8112	0.0039	0.0002	30	K2
42045.3850	−8067	0.0036	−0.0001	30	K2
42080.4070	−8022	0.0063	0.0026	30	K2
42081.1850	−8021	0.0061	0.0024	30	K2
42838.3850	−7048	0.0112	0.0072	1	P
42866.3990	−7012	0.0098	0.0058	1	P
43161.3330	−6633	0.0035	−0.0004	30	K2
43189.3510	−6597	0.0061	0.0021	1	P
43196.3530	−6588	0.0042	0.0003	30	K2
43197.1330	−6587	0.0060	0.0021	30	K2
48298.2635	−32	−0.0071	−0.0015	30	G
48323.1672	0	−0.0060	−0.0004	30	G
48334.0619	14	−0.0062	−0.0005	30	G

K=Kordylewski; B=Busch; D=Diethelm; L=Locher; P=Peter; K2=Kulkarni; G=Gu

In all above calculations we assigned weight 1 to visual minimum times, weight 3 to the photographic minimum times and weight 30 to photoelectric minimum times.

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