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NEW PHOTOELECTRIC PHOTOMETRY AND NEW TIMES OF LIGHT MAXIMUM OF AD CMi

AD CMi is a very important Delta Scuti type variable due to its 0.30 magnitude amplitude and stable light curve. Recently Jiang (1987) and Rodriguez et al. (1988) published numerous careful observations and suggested a rather different rate of increasing period variation. To check how its period varies with time, we observed it again from February to April, 1992 at Xinglong station of Beijing Astronomical Observatory by using the 60 cm reflector and its single channel photoelectric photometer in V-band. The comparison star was $BD + 1°1938$ for Feb. 3, and $BD + 1°1939$ for other dates. From these observations we derived 6 times of light maximum. Figure 1 only presents three of these light curves.

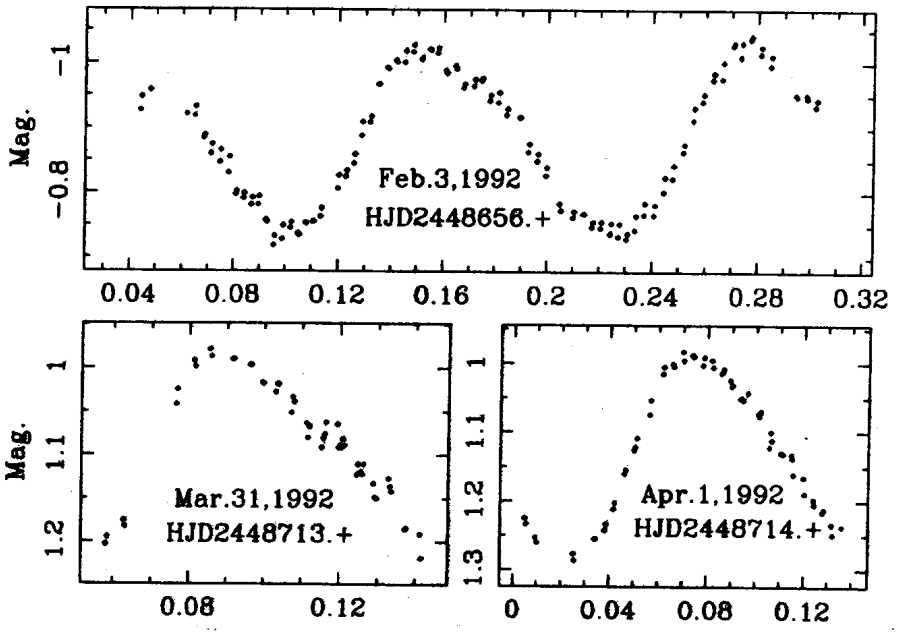

Fig.1 Light curve relative to comparison star

Table 1

Times of maximum and new O-C Residuals of AD CMi for linear and quadratic fits

No.	T_{max}	E	$(O-C)_L$	$(O-C)_Q$	W
1	36601.8228	0.0	0.0017	0.0004	1.0
2	36602.8066	8.0	0.0017	0.0004	1.0
3	36602.9296	9.0	0.0017	0.0004	1.0
4	36604.8971	25.0	0.0016	0.0003	1.0
5	36627.7700	211.0	0.0012	0.0000	1.0
6	36628.7538	219.0	0.0012	0.0000	1.0
7	36629.7373	227.0	0.0009	−0.0003	1.0
8	36629.8602	228.0	0.0009	−0.0004	1.0
9	36931.7620	2683.0	0.0003	−0.0005	1.0
10	36932.7470	2691.0	0.0015	0.0007	1.0
11	36934.8364	2708.0	0.0003	−0.0004	1.0
12	36969.7620	2992.0	0.0012	0.0005	1.0
13	41010.6985	35852.0	−0.0040	−0.0011	0.5
14	42429.4582	47389.0	−0.0010	0.0021	0.1
15	43182.4290	53512.0	−0.0030	−0.0001	2.0
16	43536.3488	56390.0	−0.0038	−0.0010	2.0
17	43536.4714	56391.0	−0.0042	−0.0014	2.0
18	44645.0877	65406.0	−0.0029	−0.0007	2.0
19	45766.3713	74524.0	−0.0007	0.0005	1.0
20	45768.3377	74540.0	−0.0019	−0.0007	1.0
21	45768.4606	74541.0	−0.0020	−0.0008	1.0
22	45771.4134	74565.0	−0.0006	0.0006	1.0
23	45772.3961	74573.0	−0.0017	−0.0005	1.0
24	45772.5187	74574.0	−0.0020	−0.0009	1.0
25	46417.3991	79818.0	0.0001	0.0006	0.5
26	46418.2596	79825.0	−0.0002	0.0003	2.0
27	46418.3825	79826.0	−0.0003	0.0002	2.0
28	46419.2434	79833.0	−0.0002	0.0003	2.0
29	46419.3663	79834.0	−0.0002	0.0002	2.0
30	46443.1010	80027.0	0.0004	0.0008	1.0
31	46443.2243	80028.0	0.0007	0.0011	2.0
32	46443.3470	80029.0	0.0004	0.0008	2.0
33	46444.0850	80035.0	0.0006	0.0010	1.0
34	46444.2082	80036.0	0.0008	0.0012	2.0
35	46444.3312	80037.0	0.0008	0.0012	2.0
36	48653.2017	97999.0	0.0035	0.0005	1.0
37	48656.1511	98023.0	0.0016	−0.0015	2.0
38	48656.2762	98024.0	0.0037	0.0006	2.0
39	48713.0884	98486.0	0.0017	−0.0015	1.0
40	48714.0724	98494.0	0.0019	−0.0013	1.0
41	48717.0242	98518.0	0.0023	−0.0009	1.0

In Table 1 we listed all the time of light maximum from the literature and our recent observations. A least squares linear solution of the ephemeris leads to the following formula:

$$T_{max} = HJD2436601.8211 + 0^{d}.122974490E.$$
$$\pm 4 \qquad \pm 6$$

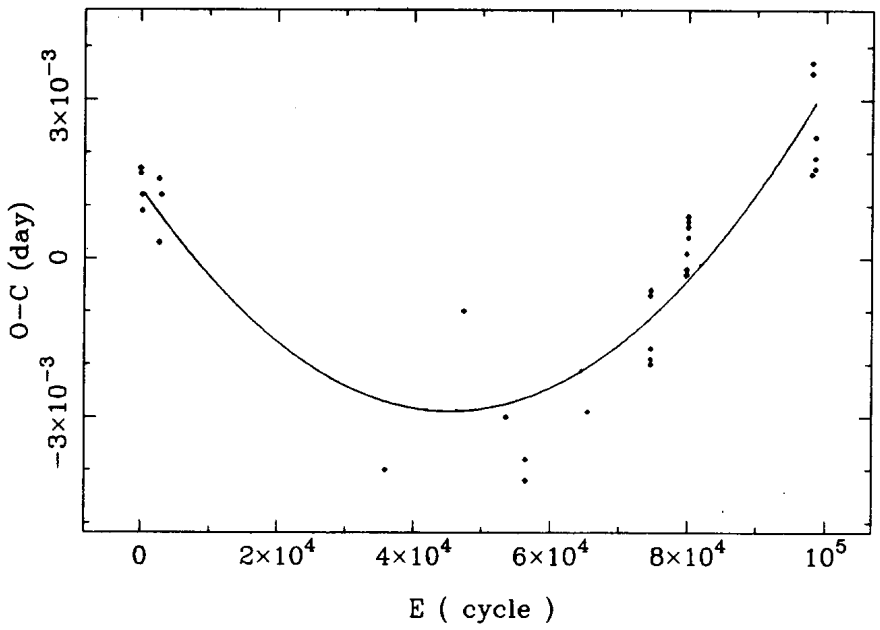

Fig.2 The O−C diagram

Figure 2 shows how the $(O-C)_L$ varies with cycle number E and also a parabolic curve of the least squares quadratic solution as follows:

$$T_{max} = HJD2436601.8224 + 0^d.12297429E + 2.19 \times 10^{-12}E^2.$$
$$\pm 2 \qquad \pm 1 \qquad \pm 11$$

Evidently, the quadratic fit is much better, so the period is clearly increasing with a rate of $(1.3 \pm 0.07) \times 10^{-8}$ days/year. On account of so small σ (only about 5% of the variation rate), our result is considerably reliable. But the very reliable observations in 1985 and 1986 could not be fitted by the curve well. We do not know why it is so. Therefore more observations are urgently needed to make clear the real situation about the period variation.

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