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NEW PHOTOELECTRIC MINIMA TIMES OF TZ DRACONIS AND ITS PERIOD STUDY

The eclipsing binary star TZ Dra (BD +47° 2625 (Faulkner, 1986)) has been observed photoelectrically from the National Observatory of Athens, Greece, during 1983. The observations were made using a two-beam, multi-mode, nebular-stellar photometer attached to the 48-inches Cassegrain reflector at the Kryonerion Astronomical Station.

The stars HD 170074 (of m_v=9.0) and HD 170357 (of m_v=8.31) were used for comparison and checking, respectively. The two intermediate pass bands of the filters used are in close accordance to the international UBV system and the photometer was cooled using dry ice. Reduction of the observations has been made (Hardie, 1962) as usual.

From our observations 4 new minima times (three primaries and one secondary) were derived. They were found using Kwee and Van Woerden's method (1956) and are the mean values of our B and V observations. They are presented in Table I the successive columns of which give: the Hel. JD; the residuals $(O-C)_I$, $(O-C)_{II}$ and $(O-C)_{III}$; and the corresponding number of cycles passed, E_I, E_{II} and E_{III}. The C's have been calculated using the three different proposed ephemeris formulae for TZ Draconis, which are:

$$\text{Min I} = 2433871.389 + 0^d.8660337\ E \qquad \text{(I)}$$

(due to Perova, 1952)

$$\text{Min I} = 2437911.4347 + 0^d.8660333\ E \qquad \text{(II)}$$

(due to Plavec, 1964)

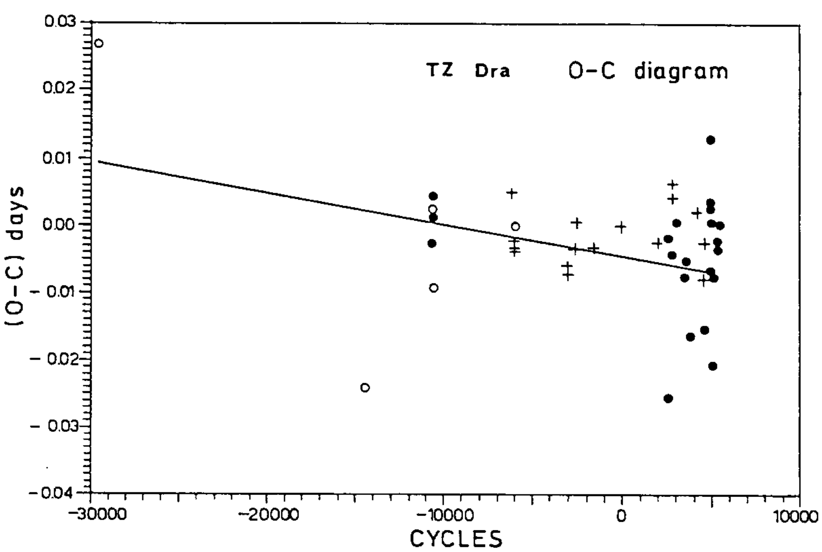

Figure 1 The O-C diagram of TZ Dra based on primary minima times only and according to Kholopov's et al. (1985) ephemeris formula. (Notations: Open circles (o) represent the photographic minima times, crosses (+) the photoelectric and filled circles (•) the visual ones.

and

$$\text{Min I} = 2442966.482 + 0^{d}.8660347\ E \qquad (III)$$

(Kholopov et al., 1985)

TABLE I

(New Photoelectric Minima Times of TZ Draconis)

Hel. JD 2440000.+	$(O-C)_{I}$ days	E_{I}	$(O-C)_{II}$ days	E_{II}	$(O-C)_{III}$ days	E_{III}
5488.3792	.0141	13414	.0192	8749	.0042	2912
5495.3097	.0164	13422	.0214	8757	.0064	2920
5497.4786	.0202	13424.5	.0252	8759.5	.0102	2922.5
5585.3717	.0109	13526	.0159	8861	.0008	3024

From all the minima times of TZ Dra found in the literature, Table II was made, in which the (O-C) values have been calculated using Kholopov's et al. (1985) ephemeris formula. Using the data of Tables I and II, the figure 1 was drown, which represents the O-C diagram of TZ Draconis, in which crosses denote the photoelectric minima times, open circles the photographic and filled circles the visual ones. From the data of Table I only the three primaries have been taken into account, since the system appears to have an eccentric orbit. As one can see from Figure 1, a linear least square fitting to all the data shows a small change in the period of TZ Dra, but since almost all the minima times (with the exception of the first two and some visual) lay arround zero this must not be true.

TABLE II
Minima Times of TZ Draconis
(According to Kholopov's et al. ephemeris formula)

Hel. JD 2400000.+	**$(O-C)_{III}$** days	**E_{III}**	**Obs.** Kind	**Reference**
17445.332	0.027	-29469	pg	Plavec, 1964
30588.272	-0.024	-14293	pg	"
3852.339	0.006	-10524	pg	"
3864.460	0.003	-10510	v	"
3865.320	-0.003	-10509	v	"
3871.390	0.005	-10502	v	"
3884.367	-0.009	-10487	pg	"
3950.196	0.001	-6024	pg	"
7840.4202	-0.0024	-5919	pe	"
7866.3999	-0.0038	-5889	pe	"
7897.5771	-0.0038	-5853	pe	"
7905.3730	-0.0022	-5844	pe	"
7911.4342	-0.0033	-5837	pe	"
7911.4353	-0.0022	-5837	pe	"
40394.353	-0.006	-2970	pe	Pohl et al., 1970
0419.4667	-0.0072	-2941	pe	"
0814.3824	-0.0034	-2485	pe	Kizilirmak et al.,1971
0852.492	0.001	-2441	pe	"
1519.3351	-0.0029	-1671	pe	Kizilirmak et al.,1974
2966.4820	0.0000	0	pe	Pohl et al., 1977
4770.4300	-0.0023	2083	v	BBSAG No. 55,1981
5223.3430	-0.0254	2606	v	BBSAG No. 62, 1982
5275.3290	-0.0015	2666	v	BBSAG No. 64, 1983

TABLE II (cont.)

Hel. JD 2400000.+	(O-C)*** days	E***	Obs. Kind	Reference
45478.8447	-0.0040	2901	pe	Faulkner, 1986
6335.341	-0.016	3890	v	BBSAG No. 78, 1985
6657.523	0.002	4262	v	BBSAG No. 81, 1986
6962.349	-0.015	4614	v	BBSAG No. 84, 1987
6981.411	-0.008	4636	v	"
7000.469	-0.003	4658	v	BBSAG No. 86, 1988
7324.372	0.003	5032	v	BBSAG No. 88, 1988
7330.424	-0.007	5039	v	BBSAG No. 89, 1988
7362.474	0.000	5076	v	"
7369.404	0.002	5084	v	"
7382.377	-0.016	5099	v	"
7467.276	0.012	5197	v	BBSAG No. 90, 1989
7480.247	-0.008	5212	v	"
7757.383	-0.003	5532	v	BBSAG No. 92, 1989
7770.372	-0.004	5547	v	"
7816.275	-0.001	5600	v	BBSAG No. 93, 1990

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