AM LEO NEEDS A NEW EPHEMERIS

Summary: about 200 visual estimates of AM Leo, an EW type variable star, seem to remark the need for a new ephemeris with a shorter light variation period. So, a new ephemeris was proposed to explain observed O-Cs, even if AM Leo needs other observations to define a more accurate one.

Introduction

AM Leo is an eclipsing binary of EW/KW type variable between 9.25 and 9.83 magnitude. In the GCVS 1985 we found the next ephemeris concerning primary minimum:

$$\text{Min. I (Hel.J.D.)} = 42493.3890 + 0.3657974 * E \qquad (1)$$

Results and discussion

Between February and May 1995 I carried out about 200 visual estimates of AM Leo using GEOS chart C84. Data concerning 11 observed eclipses were processed by SOP program[1] to obtain times of minimum, forcing light curve symmetry. In the next table these heliocentric times with relative O-Cs and the type of minimum are reported.

Tab.1 : minima of AM Leo in 1995

DATE	U.T.	HJD	O-C(1)	TYPE
6 Feb	21.13	49755.384 ± 0.008	0.002	II
19 Feb	20.30	49768.354 ± 0.006	- 0.014	I
20 Feb	22.35	49769.441 ± 0.008	- 0.024	I
22 Feb	22.41	49771.445 ± 0.029	- 0.032	II
23 Feb	20.51	49772.369 ± 0.007	- 0.022	I
2 Apr	22.10	49810.424 ± 0.005	- 0.010	I
5 Apr	20.21	49813.348 ± 0.007	- 0.013	I
19 Apr	22.16	49827.428 ± 0.013	- 0.016	II
3 May	20.07	49841.338 ± 0.009	- 0.006	II
4 May	22.31	49842.438 ± 0.012	- 0.004	II
5 May	20.10	49843.340 ± 0.014	- 0.016	I

All negative O-Cs indicate the need for a new ephemeris with a period shorter than that one provided in the ephemeris (1). Infact mean O-C is:

$$\text{O-C}_{mean} = - 0.014 \pm 0.010 \text{ day}$$

Since about 20000 cycles elapsed from the time indicated in the GCVS's ephemeris, we can estimate a correction to bring in this ephemeris (1). In this way we obtain the new ephemeris (2):

$$\text{Min. I (Hel.J.D.)} = 49800.178 + 0.3657967 * E \qquad (2)$$
$$\pm 0.0000005$$

which is in accordance with results in 1995.
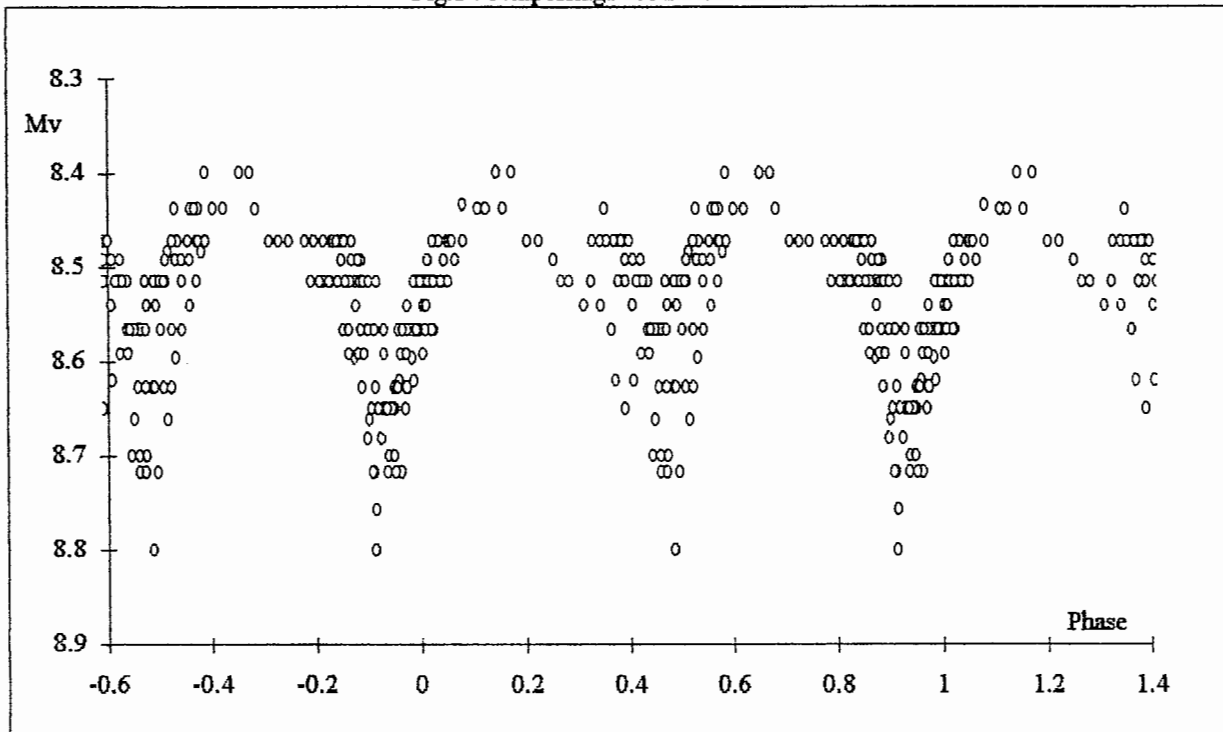The different analysis of primary and secondary O-Cs remarks a difference in the time of mutual eclipses:

$$\text{O-C(1)(I)}_{mean} = - 0.016 \pm 0.005 \text{ day}$$

$$\text{O-C(1)(II)}_{mean} = - 0.011 \pm 0.013 \text{ day}$$

The *compositage*

Observations in 1995 were used for plotting a *compositage* according to ephemeris (1):

Fig.1 : compositage of AM Leo in 1995

Conclusions

AM Leo's visual observations in 1995 seem to remark an advance in respect with foreseen times of light minima. This fact could be explained by a decrease of period indicated in the ephemeris (1). Hence, AM Leo may need a new ephemeris. Other, more extensive, observations in the future would help us to confirm the old ephemeris or to require relevant correction of it.

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References:

(1) A.GASPANI, *Stochastic Optimization Program*, ver. 5 (priv.comm.)