Asteroids, Comets, Meteors 1991, pp. 45–48
Lunar and Planetary Institute, Houston, 1992

ASTEROIDS WITH UNUSUAL LIGHTCURVES: 14 IRENE AND 51 NEMAUSA

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INTRODUCTION

Some asteroids with peculiar lightcurves have been chosen for more detail investigation. We present the first results of that study. Observations were obtained in 1989 and 1990 using the 70-cm telescope of Kharkov Observatory; the 40-cm telescope of Abastumani Observatory (Georgia) and the 60-cm telescope of the Main Astronomical Observatory of Ukrainian Academy of Sciences (mount.Majdanak, Middle Asia). Observations and their reduction were carried out in standard way. The aspect data, absolute magnitude of primary maximum and lightcurve amplitude are given in Table. The last column of the Table refers to the observation sites.

Table. Aspect data for asteroids 14 Irene and 51 Nemausa

Date		λ	β	α	$V_o(1,\alpha)$	ΔV	
14 Irene							
1990	Oct. 8	35.3	-11.4	7.7	6.89	0.12	Majdanak
	Oct.10	34.9	-11.4	7.1	6.86		- " -
	Oct.12	34.5	-11.4	6.4	6.85		- " -
	Oct.13	34.2	-11.4	6.1	6.86		- " -
51 Nemausa							
1989	March 5	176.6	-1.3	5.4	7.67	0.11	Abastumani
	May 28	170.6	4.6	26.4	8.63	0.13	Majdanak
1990	Aug. 15	319.2	9.8	4.2	-	0.10	Kharkov
	Aug. 26	316.5	9.0	7.4	-	0.11	Kharkov
	Oct. 10	312.8	4.9	21.0	8.52	0.18	Majdanak

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This asteroid was called "puzzling" since numerous observations during 5 apparitions didn't give an unambiguous result of its rotation period. Two possible values of Irene's period had been determined: $9^h.35$ and $18^h.71$ (Scaltriti et al.1981).

Our observations of 14 Irene were carried out during 4 nights in the 1990 apparition when the lightcurve amplitude was about $0^m.12$. Fig.1 shows the composite lightcurves obtained with each of two values of rotation period. As one can see "short" period contradict to our observations. Two times longer value of Irene's rotation period $P=18^h.71\pm0^h.01$ satisfies to new observations and previously published data. But in that case lightcurve of 14 Irene displays strange asymmetric shape. To our mind the determing rotation period may be only half of true value.

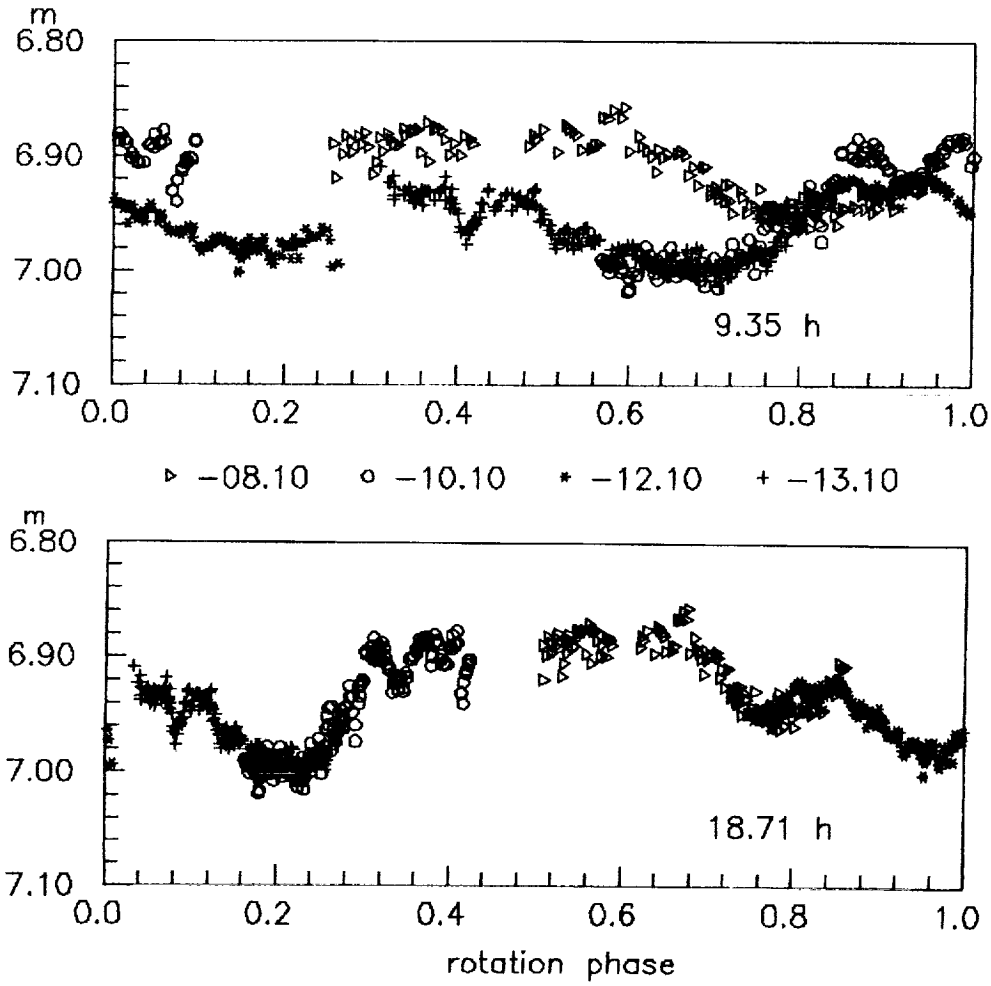

Fig.1. Composite lightcurves of 14 Irene

ASTEROID 51 NEMAUSA

Lightcurves of asteroid Nemausa display unusual shape with at least three pairs of extrema. The previous lightcurves were obtained during 6 apparations. Our observations were carried out in 1989 at small (6^{o}) and large (26^{o}) values of phase angle (Fig.2). As one can see the amplitude and shape of lightcurves are considerably changed. The next 1990 apparition of Nemausa our purpose was to study the lightcurve dependence on phase angle more detail. Fig.2 shows the lightcurves obtained in 1990 at phase angle 4^{o}, 7^{o} and 21^{o}. The lightcurve shape changes in similar way as in 1989 while the ecliptic longitude difference between the apparations is nearly 140^{o}. Rotation phases in Fig.2 have been computed using the same zero moment and corrected for aspect changes. The pole coordinates are assumed to be equal $\lambda=330^{o}$ and $\beta=-80^{o}$; $P_{sid}=0^{d}.324290 \pm 0^{d}.000001$ with retrograde sense of rotation. These values have been obtained by the method of photometric astrometry using available data (Gaamelgaard and Kristensen,1986) and our observations. But the pole coordinates have been obtained with great uncertainty since their values depend on chosen extremum. It is necessary to take into account the lightcurve peculiarities which may be caused by albedo "spots"(Hahn et al.,1986). We try to model Nemausa surface by ellipsoid with different "spots" but any acceptable result havn't been obtained.

References

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Hahn G.,Lagerkvist C-I.,Magnusson P.,Rickman H., ibid.,p.93.,

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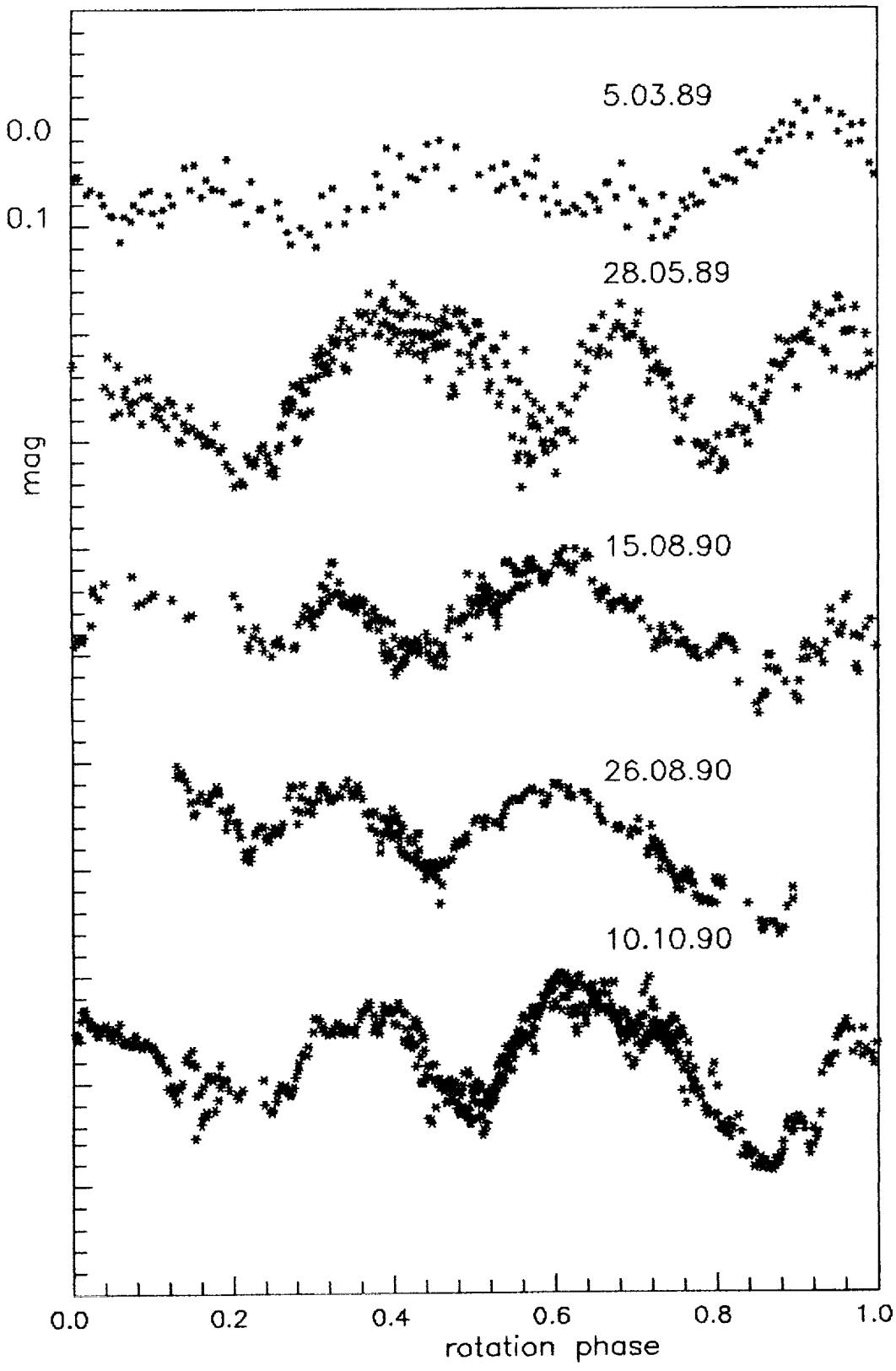

Fig.2. Composite lightcurves of 51 Nemausa