LIGHTCURVE ANALYSIS OF ASTEROID 2685 MASURSKY

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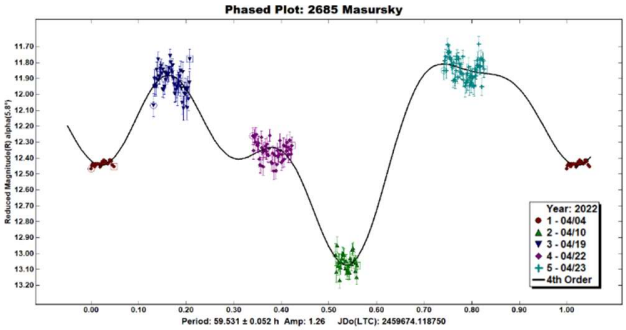
Photometric observations of the main-belt asteroid 2685 Masursky were conducted to determine the asteroid's synodic rotation period. Three telescopes based in Malta and Australia were used. The authors found a synodic rotation period of P = 59.531 ± 0.052 h with an amplitude of A = 1.26 mag.

2685 Masursky, a main-belt asteroid, was discovered by E. Bowell at Flagstaff (AZ) on 1981 May 3. It has a semimajor axis of 2.569 AU, an inclination of 12.124°, an eccentricity of 0.111, an absolute magnitude of 12.20, and an orbital period of 1504 days (JPL Small-Body Database Lookup, 2022). There are no prior recorded rotation periods for 2685 Masursky in The Asteroid Lightcurve Database (Warner et. al, 2009).

Observations of the asteroid 2685 Masursky were conducted at multiple locations with different telescopes. The first instrument used was Telescope 17 based in Siding Spring, Australia. It has a focal length of 2912 mm and a diameter of 0.43 m (iTelescope Support, 2021). Please refer to Table I for additional information. This telescope was used for observations on 2022 Apr 4. Observations on 2022 Apr 10, 19, 22, and 23 were conducted at Flarestar Observatory and Manikata Observatory in Malta with two other instruments (see Table I for further information). A luminance filter was used for all observations.

MPO Canopus (Warner, 2018) was used to analyze the images received from observations made throughout April 2022. The authors found a synodic rotation period of P = 59.531 ± 0.052 h with an amplitude of A = 1.26 mag (see Table II for more information). This rotation period is very atypical as few asteroids have a rotation period greater than 24 h. The found amplitude is also larger than expected. The final lightcurve can be seen in the figure. The shape of this lightcurve is slightly atypical; there are two maxima and two minima with a third local maximum around the data points corresponding to 2022 Apr 22. This suggests that Masursky might have an unusual shape or large craters; it might also indicate the existence of a secondary period. Given the long rotation period, we suggest future observations be planned over a longer range of time and specifically investigate the possibility of the binarity of the asteroid.



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Obs	MPC	Scope	Cam	FOV (arcmin)	Resolution (arcsec/pix)	Latitude	Longitude	Elevation (m)
SSO	Q62	0.43-m CDK	FLI Proline PL4710	15.5×15.5	0.92	31°16′52″ S	149°03′52″ E	1122
FO	171	0.25-m SCT	Moravian G2-1600	25.5×17	0.99	35°54′37″ N	14°28′12″ E	126
MO	——	0.20-m SCT	SBIG ST-9	——	—	35°55′52″ N	14°55′52″ E	35

Table I. Equipment used for observations. Obs column; SSO: Siding Spring Observatory, FO: Flarestar Observatory, MO: Manikata Observatory. Scope column; CDK: Corrected Dall-Kirkham, SCT: Schmidt-Cassegrain Telescope.

Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
2685	Masursky	2022 04/04-04/23	6.0,4.0	205	-3	59.531	0.052	1.26	——	MB

Table II. Observing circumstances and results. The phase angle is given for the first and last date. If preceded by an asterisk, the phase angle reached an extrema during the period. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude/latitude at mid-date range (see Harris et al., 1984). Grp is the asteroid family/group (Warner et al., 2009).