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ROTATIONAL PERIOD DETERMINATION FOR ASTEROIDS 5237 YOSHIKAWA

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CCD photometric observations of main-belt asteroid 5237 Yoshikawa were obtained in order to measure its rotation period. These measures were performed during two different nights on 2022/04/05 and 2022/04/10, using the instrumentation available at the Osservatorio Astronomico Margherita Hack located on the hills near Florence (Italy).

CCD photometric observations of one main-belt asteroid were carried out in 2022 April at the Osservatorio Astronomico Margherita Hack (A57). We used a 0.35-m f/8,25 Smith-Cassegrain telescope, a SBIG ST10 XME CCD camera, and clear filter. The pixel scale was 1 arcsec when binned at 2×2 pixels and the exposures were 300 sec long. Data processing and analysis were done with *MPO Canopus* (Warner, 2019). All the images were calibrated with dark and flat field frames using *Astroart 6.0* (Warner, 2006). Table I shows the observing circumstances and results.

5237 Yoshikawa was discovered on 1990 Oct 26 by Urata, T. at Oohira and it was chosen from the asteroid light curve database (LCDB; Warner et al., 2009). It is a main-belt asteroid with a semi-major axis of 2.240 AU, eccentricity 0.096, inclination 5.138 deg, and an orbital period of 3.35 years. Its absolute magnitude is H = 13.52 (JPL, 2022; MPC, 2022). Our observations were conducted in the night across 2022/04/05 and 2022/04/10 and provided 98 data points. The period analysis shows a bimodal solution for the rotational period with P = 3.4693 ± 0.0002 h and an amplitude A = 0.31 ± 0.03 mag (Figure 1). The split-halves plot (Figure 2) doesn't let us solve the potential ambiguity between monomodal and bimodal solution by showing that the two halves of the 3.4693 h solution are almost superimposable. On the other hand, the monomodal solution would involve a rotation period of 1.7347 hours, thus suggesting that this asteroid may belong to the fast rotator class. Further observations are desirable to better resolve the remaining doubts.

Moreover, we consulted the asteroid lightcurve database (LCDB, 2022; Warner et al., 2009) and we found one previous calculated period: P = 3.47 +/- 0.0004 h (Waszczak, 2015). The period we found seems to be in good agreement with the previous mentioned period.

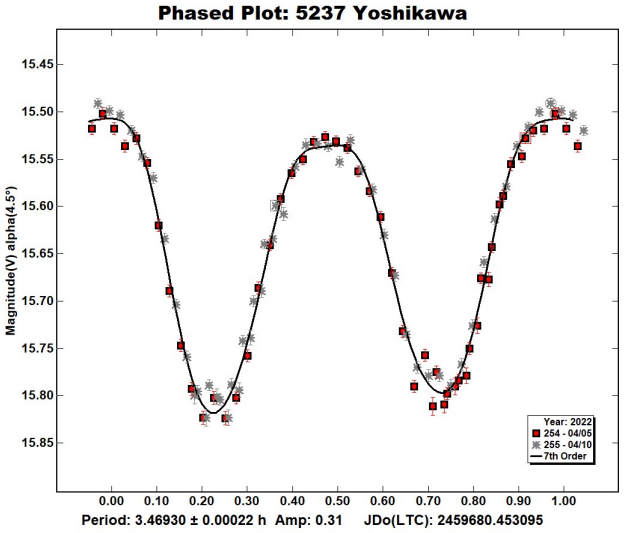

Figure 1. Phased lightcurve of 5237 Yoshikawa.

Number	Name	2022 mm/dd	Pts	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.	Grp
5237	Yoshikawa	04/05 - 04/10	98	4.5 - 1.8	202.4	2.2	3.4693	±0.0002	0.31	0.03	MBA

Table I. Observing circumstances and results. Pts is the number of data points. The phase angle is given for the first and last date. L_{PAB} and B_{PAB} are the approximate phase angle bisector longitude and latitude at mid-date range (see Harris *et al.*, 1984). Grp is the asteroid family/group (Warner *et al.*, 2009).

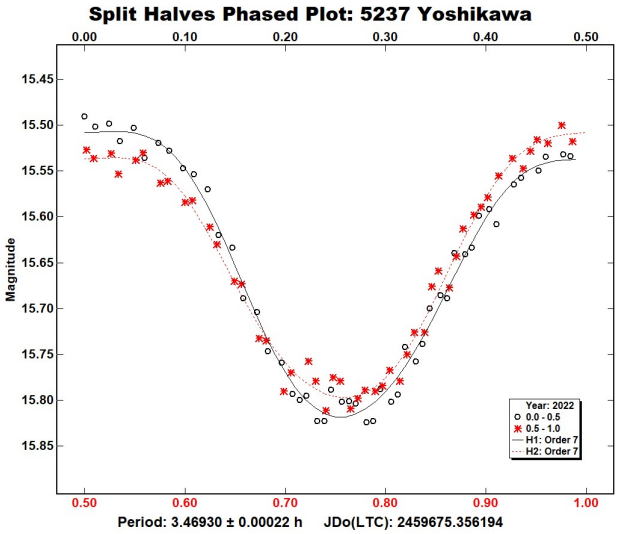

Figure 2. Split halves lightcurve of 5237 Yoshikawa.

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LIGHTCURVE PHOTOMETRY OF ASTEROID 8693 MATSUKI

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Lightcurve photometry of the main-belt asteroid 8693 Matsuki yielded an estimated period of 6.10550 ± 0.00225 h and an amplitude of 0.53 ± 0.01 mag.

CCD photometric observations of the main-belt asteroid 8693 Matsuki were carried out in 2017 April and May at the Cerro Tololo Inter-American Observatory, La Serena, Chile (807). Data were obtained with a 0.41-m *f*/17.3 Ritchey-Chretien telescope and an Andor Aspen CG230 camera using an open filter. The pixel size was 0.874 arcseconds with binning set to 2×2. All exposures were 120 seconds.

Data processing and analysis were done with *MPO Canopus* (Warner, 2019). All images were calibrated with bias, dark, and flat field frames, and the instrumental magnitudes converted to R magnitudes using solar-colored field stars from the CMC-15 catalogue. Table I shows the observing circumstances and results.

8693 Matsuki was discovered on 1992 November 16 by K. Endate and K. Watanabe at Kitami in Japan. It is a main-belt asteroid with an orbital period of 3.73 years, semi-major axis of 2.41 au, eccentricity of 0.1581, and inclination of 6.927°. It has an absolute magnitude of 13.03. The WISE/NEOWISE survey (Masiero et al., 2011) reported a diameter of 5.944 ± 0.191 km and a visible albedo of 0.379 ± 0.083. Carvano et al. (2010) assigned an S-type taxonomic class. The asteroid's dynamical family is reported as 4 Vesta (Nesvorny, 2015). While asteroids in the Vesta dynamical family are commonly associated with the V-type taxonomic class, several studies have demonstrated that a wide range of taxonomic classes are also represented (Erasmus et al., 2019; Erasmus et al., 2020).

Observations for 8693 Matsuki were conducted over two nights and collected 233 data points. The lightcurve analysis showed a solution for the rotational period of P = 6.10550 ± 0.00225 h and with an amplitude A = 0.53 ± 0.01 mag, suggested by the strongest peak in the period spectrum.

Number	Name	yyyy mm/dd	Phase	L_{PAB}	B_{PAB}	Period(h)	P.E.	Amp	A.E.
8693	Matsuki	2017 04/30-05/01	8.8	8	-4	6.10550	0.00225	0.53	0.01

Table I. 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).