

NEO Characterization

RECONSTRUCTION OF THE SHAPE AND SPIN STATE OF ASTEROID (99942)
APOPHIS FROM ITS PHOTOMETRIC LIGHT CURVES

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ABSTRACT

Asteroid (99942) Apophis is a near-Earth and potentially hazardous asteroid. The next close encounter with the Earth will happen in 2029 at the minimum geocentric distance of about 38,000 km. Apophis rotates in an excited rotation state. Due to Earth's gravitation torque, the current spin state of Apophis will change during the approach. To predict how exactly the spin will be altered, the orientation of Apophis during the close approach must be known. Pravec et al. (2014, *Icarus* 233, 48) reconstructed the spin and shape model of Apophis from photometric observation carried out in 2012/13; however, the precision of rotation parameters was not sufficient to predict the orientation for 2029. Also, the model published by Lee et al. (2022, *A&A* 661, L3) is not unique.

We will present our work on an analysis of photometric observations of Apophis. Apart from the photometric data available in the literature, we also use our observations of Apophis carried out between December 2020 and April 2021 with the Danish 1.5m telescope at La Silla, ESO. By applying the lightcurve inversion technique of Kaasalainen (2001, *A&A* 376, 302) on all available data, we aim to reconstruct Apophis's spin state and shape with such precision that would enable us to predict its orientation for the 2029 flyby.

Comments: preferentially oral, alternative session Ongoing and Upcoming Mission Highlights