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Author: Dr. Polina Levkina

Institute of Astronomy, Russian Academy of Sciences (RAS), Russian Federation, ayvazovskaya@inasan.ru

Dr. Nail Bakhtigaraev

Institute of Astronomy, Russian Academy of Sciences (RAS), Russian Federation, nail@inasan.ru

Dr. Vadim Chazov

Sternberg Astronomical Institute of Moscow Lomonosov State University, Russian Federation,
vadimchazov@yandex.ru

EMPIRICAL MODEL OF AREA-TO-MASS RATIO VARIATIONS OF FENGYUN 2D DEB

Abstract

Orbital motion of space debris objects highly susceptible to difficult-to-predict non-gravitational perturbations. Area-to-mass ratio value can be calculated directly from observations and is a variable value that depends on the rotation parameters of the object. Knowledge of the area-to-mass ratio variations can improve the prediction accuracy of the orbital elements.

The small-sized fragment of space debris 2006-053D Fengyun 2D Deb has been observed since 2007. This fragment moves in libration orbit around the Eastern stable point at longitude 75E with amplitude of 24 degrees and a period of 750 days. An empirical model of the area-to-mass ratio of this fragment was created using the results of 12-week sessions of observations at the Terskol observatory from 2009 to 2014. Area-to-mass ratio varies from 0.04 to 0.22 m²/kg. The model was composed of four curves on the interval of a single period (392 days). Each curve is a section of a sinusoid with a period of 196 days. The model of area-to-mass ratio was developed using a numerical–analytical theory of satellite motion.

Observations of Fengyun 2D Deb in 2015-2017 with the telescope Zeiss–2000 of Terskol observatory and at the telescope Zeiss–1000 of Sanglokh observatory have confirmed the validity of the model of area-to-mass ratio variations (the model was not improved by observations after 2014).

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