## 16th IAA SYMPOSIUM ON SPACE DEBRIS (A6) Interactive Presentations - 16th IAA SYMPOSIUM ON SPACE DEBRIS (IP)

Author: Dr. Polina Levkina

Institute of Astronomy, Russian Academy of Sciences (RAS), Russian Federation

Dr. Nail Bakhtigaraev

Institute of Astronomy, Russian Academy of Sciences (RAS), Russian Federation Dr. Vadim Chazov

Sternberg Astronomical Institute of Moscow Lomonosov State University, Russian Federation

## 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  $0.22 \text{ m}^2/\text{kg}$ . 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).

This research supported by grant of the President of the Russian Federation No. MK-6640.2018.2.