ORBITAL STABILITY OF HIGH INCLINATION ASTEROIDS

Nina A. Solovaya[1] and Eduard M. Pittich[2]

[1]Celestial Mechanics Department, Sternberg State Astronomical Institute
University Prospect 13, 119 889 Moscow, Russia
E-mail: ursa@sai.msk.su

[2]Astronomical Institute of the Slovak Academy of Sciences
Dúbravská cesta 9, 842 28 Bratislava, Slovak Republic
E-mail: pittich@savba.sk

The orbital evolutions of fictitious asteroids with high inclinations have been investigated. Eccentricities of the orbits cover the interval 0.0–0.4, inclinations the interval 40–80°, and argument of perihelions the interval 0–180°. The equations of motion of the asteroids were numerically integrated forward within the interval of 20,000 years, using a dynamical model of the solar system consisting of all planets.

Motion of the asteroids is limited within the phase space defined by the energy integral. The stability of their motion has been investigated from the results of the numerical integration, using the principle of the Kolmogorov entropy of a dynamical system. The Kolmogorov entropy characterized the mean deviation of calculated nearby orbits. The maximum Lyapunov characteristic multipliers are presented graphically.

An important feature of the investigated orbits is the quasi-periodical change of their geometrical shape, and their movement relative to the Sun. Asteroids with the used orbital parameters are delivered from the main asteroid belt to the near-Earth. After some period they will returned back to the main belt.