NUMERICAL SIMULATION OF BINARY AND MULTIPLE ASTEROIDS SYSTEM DYNAMICS

V.V. Troianskyi, O.A. Bazyey

Astronomical Observatory, Odessa National University, Odessa, Ukraine,

v.troianskyi@onu.edu.ua

The paper shows a method of constructing the asteroid-centric coordinate system for the study of the evolution of the asteroids orbit satellites. The model includes a central asteroid, its satellite(s), Sun, Moon and eight major planets. Also taken into account the not-sphericity of the attracting body and the pressure of sunlight on the asteroid's satellite based shadow function. The model takes into account the mutual attraction between all objects.

To calculate the distance modulus to large objects from the asteroid system, you need to know the coordinates of the asteroid-centric coordinates of the Sun, the Moon and the eight major planets. Initially we borrow heliocentric coordinates of the above objects and DE431 numerical theory. Further, the Kepler orbital elements are counting heliocentric coordinates of the asteroid, and then go to the asteroid-centric reference system.

With the help of the constructed model, the evolution of the orbits of satellites next asteroid systems were considered: the (45) Eugenia, (87) Sylvia, (10199) Chariklo, (66391) 1999 KW4, (134340) Pluto, (136108) Haumea, (136617) 1994 CC , (153591) 2001 SN263.

THE SIMULATION OF THE ORBITAL EVOLUTION OF A PASSIVE HIGH-ORBIT FRAGMENT WITH LARGE SURFACE AREA

V.V. Troianskyi, O.A. Bazyey

Astronomical Observatory, Odessa National University, Odessa, Ukraine,

v.troianskyi@onu.edu.ua

Today there are tens of thousands of artificial celestial bodies in the near-Earth space. Most of them belong to the space debris as such worn-out artificial satellites or their fragments. Such celestial bodies can remain in high orbits essentially indefinitely. Their motion is subjected to the perturbations by the Moon and Sun, as well as by the asymmetry of the Earth's gravitational field. The high-orbit objects are monitored using optical telescopes. This paper describes a new method for de-orbiting of worn-out artificial satellites from the geostationary orbits in the near-Earth space to lower altitudes.

For the first time such a considerable amount of data over long time intervals was gathered for the objects with high area-to-mass ratios that enabled us to determine and estimate their observation and orbital characteristics. The method of the celestial body orbit changing in the near-Earth space which is described in this paper can be useful in solution of the near-space ecology problem, particularly in the cleaning up the near-Earth space from the artificial space debris using the solar radiation pressure only.