Paper ID: 38118
oral

ASTRODYNAMICS SYMPOSIUM (C1)
Orbital Dynamics (1) (8)

Author: Dr. Feng Jinglang
Nanjing University, China

Dr. Hou Xiyun
Nanjing University, China
Dr. Jingshi Tang
Nanjing University, China
Prof. lin Liu
Nanjing University, China

THE SECULAR DYNAMICS AROUND ASTEROID WITH PERTURBATION FROM SOLAR RADIATION PRESSURE

Abstract

Considering the uniformly rotating second degree and order gravitational field, this study focuses on the systematic study on the secular evolution of orbital motion with small to moderate eccentricity and inclination around the asteroid under perturbation from solar radiation pressure (SRP). With Hamiltonian approach, the dynamics is firstly averaged over the fast angle variable through the canonical transformation. The obtained Hamiltonian is actually the secular dynamics, and its analytical approximations are obtained from the construction of normal form to low order. In addition, the potential secular resonances between the slow variables of the orbital motion are checked from the Hamiltonian and the corresponding resonance region is identified. The secular evolutions of orbital eccentricity and inclination for orbital motion within or out the resonance regions are analyzed from the analytical solutions. The stable and unstable region of secular motion around asteroid under perturbation from SRP can be described. Then, the analytical approximation is compared with numerical propagations for different magnitudes of the SRP, to test its accuracy. This study provides insight into the secular dynamical behavior around asteroid with SRP and can be applicable to future mission design around asteroids.