

SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

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OPTIMAL LOW-THRUST TRAJECTORIES TO REACH THE ASTEROID APOPHIS

Abstract

Apophis is considered by the Greeks as chaos, the God of destruction. For this reason, in current times, this name returns to scene to represent a destructive threat potential to the Earth. It is the name of an asteroid that orbits a region that represents a high risk of colliding with the Earth. This asteroid was discovered in 2004 and received the initial name of 2004MN4. Then it was named Apophis, and several researchers and institutes are monitoring and designing missions with the goal to find more information about the asteroid. The present research has the goal of finding optimal (in the sense of minimum fuel consumption) interplanetary missions, based in solar electric propulsion, to send a spacecraft to Apophis and others asteroids. Gravity Assisted Maneuver will be used to reduce mission costs, combined with the use of the high specific impulse of the electric propulsion to perform this maneuver. The spacecraft is assumed to leave the Earth from a Low Earth Orbit (LEO) and arrives on the asteroid Apophis using ion propulsion. An indirect optimization method will be used in the simulations.