

ASTRODYNAMICS SYMPOSIUM (C1)
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CONTROL MOVEMENT OF ELECTRIC PROPULSION SPACECRAFT IN IRREGULAR
GRAVITATIONAL FIELD OF ASTEROID

Abstract

In this paper we consider a methodology of spacecraft movement simulation near objects with extremal non-spherical gravitational fields. It is proposed to use barycentric method for a gravitational field simulation near the asteroid Eros. Thus, the problem of simulating gravitational field was reduced to the n-body problem. By this means the gravitational field of an asteroid is a superposition of point potentials. The article describes advantages of the proposed method in comparison with the method of the gravitational potential in spherical functions. The main advantage of the proposed method is the simple program realization. Accuracy of the method allows using it for spacecraft movement simulation at a distance – 50 km and more from the surface of Eros. Sun impact was taken into consideration and three-dimensional problem was solved. Under these assumptions the control program were obtained in a number of ways. In first way, we used the locally optimal control operations such as operations comply with maximum and minimum of orbit osculating elements. In the second way, the formalism of the Pontryagin's maximum was used to define control angles and terminal functions of the power plant. We created special software to spacecraft movement simulation near objects with irregular gravitational field.