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Space Elevator Critical Technology Verification and Validation Testing (3)

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SPACE ELEVATOR OPERATION IN PROXIMITY OF ASTEROIDS

Abstract

Weak irregular gravitational field of an asteroid and fairly large centrifugal force represent serious difficulties for spacecraft operations in a vicinity of asteroid. One of possible solutions to the problem could be placing the spacecraft near the asteroid and connecting it to the surface by tethers, making use of several advantages that space elevators provide. In present paper, the relative equilibria of such elevator are considered in the framework of rather simple model. We study spacecraft attached to the surface of a uniformly rotating celestial object via an extensible tether. The domains, where the spacecraft can be held using such structure, are described. Stability of the found relative equilibria is studied as well as the influence of the elastic force to equilibrium configurations. The results are illustrated considering particular case of a body with spherical mass distribution