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OSCILLATIONS OF SMALL SPACE TETHER SYSTEM EXPOSED TO AERODYNAMIC MOMENT

Oscillations of the gravity-stabilized space tether system exposed to an aerodynamic moment in low Earth near-circular orbits are examined. The emphasis is on the study of the dynamics of small space tether systems based on a triple CubeSat. This approach is validated by a need for the preparation of a full-scale experiment with an electrodynamic space tether system. It is demonstrated that an aerodynamic moment can affect significantly the dynamics of the space tether systems under consideration and result in resonances in oscillations of the space tether systems, which are perpendicular to the orbit plane. To attain the gravitational stabilization, it is necessary that the parameters of the space tether system should be corresponded to the desired computational values of an atmospheric density in an assumed orbit of a mass-center motion. The simple analytical expressions for estimating an amplitude of oscillations of the space tether system relative to the mass center are derived. The study results can be employed to choose the parameters of an experimental space tether system and the orbit of its motion or to estimate the aerodynamic effects on oscillations of the space tether system with the selected parameters.

Keywords: *space tether systems, aerodynamic moment, oscillations relative to mass center, resonances.*

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