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DYNAMICS ANALYSIS OF FLEXIBLE CONE UNDERGOING SPACE DOCKING

Abstract

In this paper, a new kind of flexible cone composed of the thin-walled plates based on space probe-cone docking mechanism for small-sized spacecraft is presented. The theoretical model of docking impact dynamics, which takes into account the additional stiffness terms, is derived based on Lagrange Analytical Mechanics theory and Hertz contact theory. Finite element method is employed for discretization of the thin-walled plate. Results of the theoretical model by using the present method are compared with those by the conventional method without considering the additional stiffness terms. The influence of flexible cone parameters on impact process is also investigated systemically. Furthermore, results of the theoretical model show a good agreement with the experimental results.