ASTRODYNAMICS SYMPOSIUM (C1)
Orbital Dynamics (1) (2)

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IDENTIFICATION OF FAMILIES OF PERIODIC ORBITS ABOVE/BELOW THE SOLAR SAIL EARTH-MOON LIBRATION POINTS

Abstract

This paper addresses the problem of finding periodic solutions in the circular restricted three-body problem (CRTBP) with the Earth and Moon as the two primaries and the third massless body a solar sail. Prior results have been developed above or below the Earth-Moon L_2 point. These orbits were accomplished by using an optimal choice of the sail pitch angle, which maximize the out-of-plane distance. Based upon the first-order approximation, an analytical formulation of the periodic orbits at linear order is presented. The approximate analytical solutions found are utilized in a numerical search to determine displaced periodic orbits in the full nonlinear model. A continuation method is then used by perturbing the sail pitch angle to generate a family of orbits. In order to illustrate the near term and possible future orbits that can be achieved, we have generated the results for several values of the sail pitch angle and fixed characteristic acceleration.