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Orbital Dynamics (1)

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ON THE LOW-ENERGY TRANSFERS BETWEEN ICY MOONS OF JUPITER

Abstract

Following the recently renewed interest towards the exploration of the Galilean moons of Jupiter (e.g., the joint NASA/ESA Laplace mission project), a considerable impulse has been given to the search for fuel- and time-efficient transfer and exploration trajectories within the system. In this contribution, we investigate the exitence and the characteristics of low-cost connections between libration point orbits of two planet-moon three-body problems in the planar circular approximation (CR3BP), and assuming that the orbits to be connected are coplanar. The study is made in the coupled model and consists in patching trajectories at an appropriately chosen Poincare section by means of one impulsive maneuver. Previous investigations have identified impulsive connections of this type between Ganymede and Europa with an associated cost of 1200 m/s. By means of several approaches involving both invariant manifold orbits and transit orbits over a large energy range and varying the relative phase between the coupled problems, we aim at drawing a complete picture of the available connections in terms of fuel consumption and transfer time.