

# **Orbital maneuvers between halo orbits**

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This paper has the goal of studying the problem of orbital transfers between two Halo orbits. Halo orbits are special three-dimensional trajectories that exist around the Lagrangian points of the restricted three-body problem. These orbits are studied in several papers, since they have important applications in astronautics. The first step involved in this research is to perform the determination of the Halo orbits. To do that, an analytic calculation is performed using the Linstedt-Poincaré method. The present paper considers that a maneuver will be performed to transfer the spacecraft from an initial to a final Halo orbit. The control that will be used to achieve that goal is constituted by a pair of instantaneous change in the velocity of the spacecraft at the beginning and at the end of the maneuver. A numerical algorithm based in the Lambert Problem is built to calculate the transfer orbits. The two orbits are divided in several points and the algorithm is applied to each pair of points. Finally, the solution that gives the minimum fuel consumption is found. This maneuver can be used to: i) change the orbit of the spacecraft to allow a second application in a different Halo orbit; ii) to perform station keeping in a Halo orbit that is escaping from its nominal orbital parameters.