

# Transfers from LEOs to GEOs visiting libration points in the Sun-Earth RTBP

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The main objective of the work is to find low cost transfer trajectories from a LEO orbit to a GEO orbit, which will have passages around a neighborhood of a libration point. Instead of using the invariant manifolds of the central manifold of the libration points, we proceed as follows. We consider the Sun-(Earth+Moon) Restricted Three Body Problem. Firstly, we obtain a catalogue of initial conditions that leave a neighborhood of the Earth at a certain altitude and such that their orbits reach a neighborhood of a libration point  $L_1$  or  $L_2$ . That orbits are admissible to be *captured* and, with a small manoeuvre, inserted in a stationary orbit around the equilibrium point, if needed. The orbits at a LEO altitude (approximately at 7000 km from the center of the Earth), are integrated forwards in time, while the orbits at a GEO altitude (approximately at 42000 km) are integrated backwards. Secondly, a matching-refinement procedure is used in order to find, among both catalogue of orbits, those that agree in positions, so that a difference  $\Delta v$  in velocities is obtained. The last objective is to identify the trajectories with the small manoeuvre such that can be used as a transfer from a LEO to a GEO orbit.