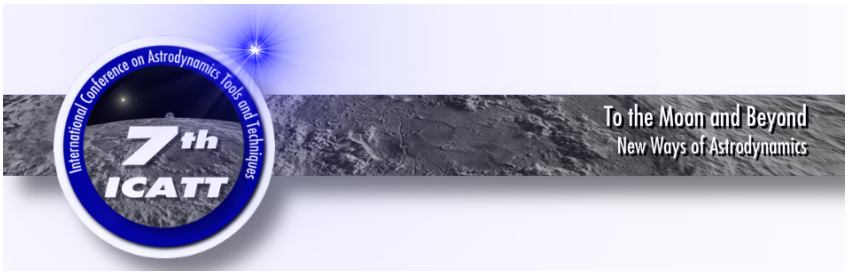

Contribution ID: **35** Type: **Oral presentation at the conference**

SOLAR-SAIL TRANSFERS FROM INVARIANT OBJECTS TO L5 PERIODIC ORBITS

Friday, 9 November 2018 09:30 (30 minutes)

The continuing development of solar-sail technology in combination with the rising interest in a mission to the Sun-Earth L_5 point for heliophysics and the search for Trojan asteroids, raises the question of using solar sailing as the primary propulsion method to enable such a mission. This paper therefore investigates a range of solar-sail transfers to the L_5 point, departing from different invariant objects in the neighbourhood of Earth: natural and solar-sail displaced equilibrium points, families of periodic orbits and their associated stable invariant manifolds. Also the arrival conditions are varied to be either natural or solar-sail displaced periodic orbits around the L_5 point. The transfers are obtained using a hybridisation of different trajectory design techniques. First, a multi-objective genetic algorithm is applied to obtain near-feasible initial guesses, which are transformed into feasible transfers using a differential correction method. Through a continuation on the fixed time of flight, the differential corrector is subsequently used to reduce the transfer time. As the differential corrector implements a stepwise constant control of the solar-sail attitude, a pseudospectral optimisation method is finally taken at hand to obtain a smooth, continuous control profile, to, if possible, further reduce the transfer time. This approach results in fast solar-sail transfers of 396 to 1194 days, depending on the departure and arrival configuration and the assumed solar-sail technology. These results can serve as preliminary design solutions for a mission to the Sun-Earth L_5 point.

Please find an extended abstract in the attached pdf-file

Summary

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