

Optimal-control-based Algorithms for Low-Thrust Docking with a Constrained Approach Direction

Research Project 2 - [085852]

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In this project two new guidance laws for a perfect rendezvous from a terminal approach direction, i.e. docking, are derived. The first applies the optimal-control-based perfect rendezvous guidance law, while the final point parameters are moving along the desired approach direction. Although it was derived in the optimal control framework, it is not the optimal solution due to the final point motion modification. The second guidance law softly constrains the chaser to pass through two intermediate points on the approach direction, in addition to the rendezvous soft constraint at the end of the scenario. That way, the chaser tends to keep its motion on the desired approach direction. Simulations were performed in order to evaluate and compare the guidance laws, showing small miss distances, velocity misses, and angle misses. It is concluded that the moving final point algorithm kept the approach direction more accurately comparing to the intermediate points guidance law, while the latter provided substantially smaller position and velocity misses.

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