

Research Project 1: Optimal Control Based Soft Landing with Path Constraints

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In this project, we developed an optimal-control-based soft landing guidance law with a path constraint, which enables to control the approach angle and avoid ground collision. We employed 3D point mass dynamics with a constant gravitational field, and a path constraint in the shape of an approach cone, and were able to numerically find an optimal solution to the constrained problem using a hp-adaptive version of the Legendre-Gauss-Radau pseudo-spectral method, implemented by GPOPS-II. The numerical algorithm was validated using an analytical solution to the unconstrained problem, and then analyzed to understand the optimal solution's behaviour around the constraint, in order to try to analytically solve it in the future.

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