Optimal Impulsive Orbital Maneuver Synthesis Through Direct Optimization

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Plan

Context

Problem Statement

Central Question

What is the most efficient sequence of maneuvers that takes a spacecraft from an initial state to a final state in a given time?

- Efficient: least propellant usage
- General case in mind (no particular analytical solutions)
- How much time? Feasibility, trade-offs?
- How many impulses?
- Is it optimal?

Hypotheses

- Choice for *impulsive propulsion* $\rightarrow$ reducible to parameter optimization
- Good numerical solvers: Ipopt[1]

References I

Andreas Wächter and Lorenz Biegler.
On the implementation of an interior-point filter line-search algorithm for large-scale nonlinear programming.
Mathematical programming, 106:25–57, 03 2006.