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Trajectory Optimization Using Regularized Variables

When a space vehicle trajectory passes through regions with significantly different gravitational fields, accurate numerical analysis often requires much computer time. Results obtained in celestial mechanics indicate that regularization transformations may be used in the formulation of trajectory optimization problems to reduce the computation time.

In this investigation, regularized equations for a particular optimal trajectory are obtained and compared with the unregularized equations with respect to computational characteristics, using perturbation-type numerical optimization. The comparison, for the case of a three-dimensional, low-thrust, Earth-Jupiter rendezvous, indicates that the regularized equations yield a significant reduction in computing time. Also, within the range of values considered, the convergence of the regularized equations is much less

sensitive to errors in the unknown boundary conditions.

Note:

- Requests for further information may be directed to:
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No patent action is contemplated by NASA.

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