Abstract

An optimal explicit guidance law that maximizes terminal velocity is developed for a reentry vehicle to a fixed target. The equations of motion are reduced with differential flatness approach and acceleration commands are related to trajectory's parameters. An optimal trajectory is determined by solving a real-coded genetic algorithm. For online trajectory generation, optimal trajectory is approximated. The approximated trajectory is compared with the pure proportional navigation, and genetic algorithm's solutions. The near optimal terminal velocity solution compares very well with these solutions. The approach robustness is examined by Monte Carlo simulation. Other advantages such as trajectory representation with minimum parameters, applicability to any reentry vehicle configuration and any control scheme, and Time-to-Go independency make this guidance approach more favorable.

References

On-Board Near Optimal Flight Trajectory Generation using Deferrential Flatness

- Zerar M. , Cazaurang F. , Zolghadri A. 2005. LPV Modeling of Atmospheric Re-entry
Vol. 26, No. 2, 243-258.
- Shneydor, N. A. 1998. Missile guidance and pursuit; kinematics, dynamics, and control, Chichester, Horwood Publishing Ltd.

Index Terms

Computer Science          Applied Mathematics

Keywords