

CLOSED LOOP GUIDANCE SCHEME FOR RLV-TD HEX-01 MISSION

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Abstract

The closed loop guidance algorithm of Re-usable Launch Vehicle Technology Demonstrator, Hypersonic EXperiment (RLV-TD HEX) mission is discussed in this paper. Meeting the experimental objectives without violating vehicle safety requirements was the major challenge in guidance algorithm development. Vehicle maneuverability limitations and on-board computer implementation requirements imposed constraints on the algorithm. Guidance algorithm is designed to keep the interactions with other sub-systems minimal to ensure the safety and integrity of the vehicle. Reference trajectories are generated on-board and guidance commands to track these trajectories are computed. Innovative strategy to control horizontal velocity without deployable surfaces is also developed. Dynamic limiting of normal acceleration commands to limit the angle of attack excursions is also an innovation. The guidance algorithm is validated in 6-D simulations to ensure performance and robustness of the algorithm under various flight conditions.

Keywords: RLV, Closed Loop Guidance, Approach and Landing, Normal Acceleration, Bank Angle