

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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A FEASIBILITY STUDY ON A SINGLE STAGE TO ORBIT SPACE LAUNCH VEHICLE WITH
CONCEPTUAL AIRBREATHING ENGINES

Abstract

A conceptual Single-Stage-To-Orbit (SSTO) Reusable Launch Vehicle (RLV) powered by conceptual airbreathing combined cycle engines for the purpose of efficient access to orbit has been constructed in this paper. The work is a further study based on the comparison conclusions of different propulsion concepts presented at IAC 2014. With an optimization program developed from General Pseudospectral Optimization Software codes (GPOPS), feasibility studies and sensitivity analysis of the vehicle's influential design parameters are performed. As a result, key influential parameters and intricate behaviors of the vehicle performance, especially during airbreathing working range, have been identified and analyzed. Conclusively, this research provides useful insights into the technological requirements of a SSTO RLV to fulfill the desired mission with the vehicle and configuration considered. Given to the advantages such as reusability, launch cost, flight safety and reliability, it would be a promising method from earth to orbit in the coming years.