

MISSION DESIGN CHALLENGES IN SOUNDING ROCKET BASED SCRAMJET ENGINE TEST VEHICLE

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Abstract

The design challenge of scramjet testing in flight using sounding rocket is to ensure that rocket provides a conducive environment to scramjet engine in terms of Mach number and dynamic pressure window irrespective of its own performance deviations of propulsion, aerodynamics, mass properties and launch day wind environment. As sounding rockets are unguided and uncontrolled, it is important to ensure mission success under any deviations that can be experienced in flight. This is ensured by appropriate trajectory design and large number of simulations. This paper describes how the design parameters have been selected to ensure that mission objectives are met even under off-nominal performances of the systems and without the need for real time decision or active control. The robustness of mission design has been confirmed through a large number of MC simulations and demonstrated in the successful scramjet flight that carried out by ISRO.

Keywords: Scramjet Engine, Flight Test, Real Time Decision, Trajectory Variation, Offnominal Performance