Paper ID: 46852
interactive
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IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Interactive Presentations - IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (IP)

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PERFORMANCE OPTIMIZATION OF THE METHANOL/LOX SOUNDING ROCKET SYSTEMS

Abstract

This paper explores the various systems of a Methanol/LOX sounding rocket, with an apogee of 100KM. It will showcase the optimal conceptual system analysis and initial design of the rocket engine. (a) Propellant performance investigation of Combustion Chamber Conditions and the Nozzle Expansion Process. (b) Recovery System event number determination, specific apogee deployment and separation methodology. (c) Control System specifications of electrical sensors, gimbaled thrust and fin design for stabilization. (d) Payload System ejection mechanism.

The paper will also study a future launch from Kuwait. Kuwait offers various strategic locations for the launch, 29 degrees north of the Earth's equatorial plane. This location allows the rocket to take advantage of Earth's rotational spin. The speed increases the nearer you are from the equator, and at 29 degrees north of the Earth's equatorial plane an object will be travelling at a speed of about 410 m/s (916 mph), which in turn reduces the amount of fuel needed to reach orbital altitudes, thus lowering the overall cost of launch. The study will include the optimal launch platform location, safety methods and the scientific experiment to be included as a payload.

Keywords: Combustion Chamber, Nozzle Expansion, gimbaled thrust, event number, Methanol/LOX, sounding rocket, Kuwait.