Paper ID: 70383
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IAF SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations - IAF SPACE PROPULSION SYMPOSIUM (IP)

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PROPELLANT GRAIN DESIGN FOR SOLID STRAP-ON BOOSTER OPERATING UNDER MARTIAN CONDITION AND SELECTING THE APPROPRIATE PROPELLANT.

Abstract

This paper is about the development of grain configuration for strap-on solid motors while launching from Martian base. In near future after building up first mars base, the astronauts will require a launch system to get them back home or either to travel beyond mars. Considering chemical rockets, an essential part is their SRBs or strap-on rocket motors as this motors provide the initial thrust to lift off the whole rocket. When compared to Earth, the atmospheric conditions on Mars and the planetary configuration are different. For example, because Mars' gravity is lower than that of Earth, less effort is necessary to raise the vehicle, and because lifting force is directly accounted for by the burning area of the propellant grain. As a result, SRBs utilized on Earth would be ineffective on Mars. To address this issue, the development of a solid propellant grain and the selection of an acceptable propellant are critical tasks. The technique employed is to first choose a solid propellant that can be easily manufactured indigenously on Mars and for which raw ingredients are abundant. According to the performance of the solid propellant, a grain configuration is developed to meet the predetermined standards, which include being capable of launching under Martian conditions, providing enough thrust to lift the rocket assembly with payload, being robust under minor disturbances, providing steady propulsion, and propelling the spacecraft to an optimum height to ignite the remaining stages. This research will give us with insights into how SRBs behave under diverse environmental changes and how they can be controlled to achieve the desired output. In conclusion, SRBs have become an inseparable element of the space industry because they have been in use since the dawn of the space age, and unleashing their potential in new areas will lead to further advancements in rocket technology.