

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (1) (3)

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TECHNOLOGY DEVELOPMENT OF AN ELECTRICALLY DRIVEN PUMP FED STORABLE
LIQUID BI-PROPELLANT FOR A MARS ASCENT VEHICLE.

Abstract

A Mars Ascent Vehicle (MAV) as part of a potential Mars Sample Return (MSR) campaign poses a very unique engineering challenge. Potential requirement for payload mass of Martian soil and atmosphere continue to grow which demands a more capable propulsion system than previously envisioned. MAV has been the focus of technology development and design efforts at JPL for several years. With the increase in payload recent trajectory and navigation studies indicated that optimum propulsion performance for a MAV could be realized using an electrically driven pump fed storable liquid bi-propellant propulsion system in the 3000-4500N (600-1000 lbf.) thrust range. A study was undertaken in 2015/2016 to examine this type of propulsion system approach. This study generated a detailed layout and mass breakdown for a light-weight and low-complexity electrically driven pump fed MAV. This was compared to an equivalent conventional state of the art (SOA) pressure fed bi-propellant system. The results and implications for a MAV system from this study will be outlined as well as potential use of this type of system on future outer planet missions.