IAF SPACE PROPULSION SYMPOSIUM (C4)
New Missions Enabled by New Propulsion Technology and Systems (9)

Author: Ms. Sagarika Rao Valluri
RNSIT Bangalore, India, sagarikavalluri1@gmail.com

Ms. Anshoo Mehra
Sasmos HET Technologies Limited, India, anshoo.m@sasmos.com
Ms. Rachel D'Silva
PEC UNIVERSITY OF TECHNOLOGY, Kuwait, rachelsdsilva@gmail.com
Ms. Dhanisha Sateesh
Space Generation Advisory Council (SGAC), India, dha.tulip@gmail.com

ANALYSIS BASED MULTI-MODE PROPULSION SYSTEM FOR LANDER MISSIONS THROUGH SIMULATION

Abstract

The increase in lander missions within the space community has set a basis for economically viable, fuel-efficient and experimental propulsion systems. The propulsion system allows for a single framework driven by multiple modes (i.e. chemical and electric) of propulsion. The paper extends the idea of a multimode propulsion system to a combination of multistage multimode propulsion that allows the lander vehicle to switch between the different modes of propulsion based on the trajectory stage between launch and landing. A study model between various propulsion systems is presented, and, using the inferred results, an optimised multistage multimode propulsion system is designed. Each stage is unique to a specific propulsion system based on trajectory, gravitational pull, fuel and physical parameters. The simulations for each stage are presented, and the system design for a lander mission is given. We use the model to study multiple previous missions to replace the propulsion system and check for the most optimal results. The multistage multimode propulsion system increases the longevity of travel, mission sustenance, and efficiency despite the characteristics of chemical and electric propulsion systems individually. We surmount the limitations of the individual systems using a stage adaptive combinational ratio of the propellants. The analysis and comparative models provide a foundation of multistage multimode systems whose applications can be implemented in orbiter, small satellites, rover and launch vehicle systems.