Paper ID: 74058
student

IAF SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations - IAF SPACE PROPULSION SYMPOSIUM (IP)

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

Ms. Nandini Singh
Cranfield University, UK, United Kingdom, singh.nandini12@gmail.com
Ms. Anshoo Mehra
TU Berlin, Germany, anshoo.m@sasmos.com
Ms. Dhanisha Sateesh
Space Generation Advisory Council (SGAC), India, dha.tulip@gmail.com

SIMULATION ANALYSIS OF MULTIMODE PROPULSION SYSTEMS FOR SATELLITES

Abstract

Multimode propulsion is using two or more propulsion techniques using a shared propellant. Through matlab simulations we infer that monopropellants yield optimal results for launch vehicle trajectories in terms of delta V calculations. We extrapolate the simulations of monopropellants to satellites - cubesats, nanosats and introduce the concept of micropropulsion systems. We focus on new propellant variants other than monopropellants such as cold gas bhutan propellant. The paper creates a comparison analysis for different multimode propellant candidates for various satellite types and then simulates the high electric impulse and thrust factors in each case. The study also simulates the varying burn ratios between electric and chemical modes of propulsion to find optimal results. The simulations consider the various capabilities of propulsion such as orbital altitude, orbital transfer, and high thrust impulsive maneuvers. The monopropellant simulations for these specific tasks for satellites yield near ideal results highlighting stability, safety and high performance. We attempt to bring in the factor of LEO, GEO and MEO satellites to notice changes in performance of the propellant as well. With regard to shared thrusters in multimode propellant systems, a multi mode integrated monopropellant electrospray thruster is designed to test and simulate the capabilities of multimode systems. This thruster is designed specifically for satellite operations. Through the paper we highlight the significance of monopropellant capabilities for multimode systems for satellites and study the significant characteristics of monopropellants for satellite operation.