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ON-ORBIT DEMONSTRATION OF RUDRA 0.3 HPGP GREEN MONOPROPELLANT THRUSTER SYSTEM IN POEM-3 PSLV C-58 MISSION.

Abstract

RUDRA 0.3 HPGP Green Monopropellant Propulsion system package was launched as a secondary experimental payload on the PSLV Orbital Experiment Module – 3 (POEM -3) of PSLV C58 mission in January 2024. Demonstrating successful ignition followed by pulsed and steady state firing of a Green Monopropellant thruster system packaged in a modular 3U configuration including propulsion controller card in LEO was considered as the mission success criteria. Bellatrix Aerospace had built RUDRA 0.3 HPGP package incorporating 100g capacity positive expulsion additive manufactured tank, service valves, master flow control valve and thruster chamber assembly with indigenously developed fast acting solenoid valve and a thruster housing long life catalyst. BHM 01A (Bellatrix Aerospace Proprietary HAN based Green Monopropellant) was prepared and loaded to the propellant tank. Thruster capable of delivering 400mN nominal thrust with the specific impulse 200s was realized. ETL completed RUDRA 0.3 HPGP package was mounted on the POEM -3 platform and powered by on-orbit. Propulsion system characterization includes closed loop thruster firing, On-orbit total impulse measurement, thrust chamber temperature measurement, and Propellant tank pressure monitoring were completed in this mission. This paper provides a brief background of the success of RUDRA 0.3 HPGP, including objectives of the technology demonstration, and presents on-orbit thruster firing results of package.