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SPACE PROPULSION SYMPOSIUM (C4)
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APPLYING A MATURE GREEN PROPULSION SOLUTION TO ENHANCE FUTURE MISSION CAPABILITIES

Abstract

Capitalizing on over a decade of RD and technology maturation in green propellants, this paper will explore the current flight ready capabilities of Aerojet Rocketdyne's AF-M315E propulsion system, the efforts taken to get there and the mission advantages and trades the propellant and propulsion system offer. It will provide a comprehensive look at the overall system performance and the test results, capabilities and maturity of the propulsion system components – including the capabilities of the 1 N (GR-1) and 22N (GR-22) thrusters. This work is a result of more than fifteen years of applied research in hydroxyl ammonimum nitrate (HAN) – based monopropellants, spanning 0.4N to 650N thrust, both direct thrust and plenum based systems and chamber pressures ranging from 5.2 bar to 92 bar (75 psia to ¿1330 psia). Recent breakthroughs are yielding stable thrusters with demonstrated firings of a 1-N class thruster of up to 11.5 hrs of cumulative duration using AF-M315E ionic liquid monopropellant. These breakthroughs enabled the development of mature solutions ready for flight. High performance green propellants are providing an alternative solution that can eliminate expensive storage, handling and disposal procedures which are required to address the propellant toxicity and flammability hazards of hydrazine while offering superior performance. The high performance AF-M315E offers a50