Paper ID: 85757
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IAF SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations - IAF SPACE PROPULSION SYMPOSIUM (IP)

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OPTIMIZING LAUNCH SYSTEMS: PROPULSION AND STRUCTURAL INNOVATIONS FOR ENHANCED EFFICIENCY IN ADVANCED VEHICLES

Abstract

This research introduces a innovative shift in launch vehicle engineering through the integration of multiple pulse detonation engines equipped with a sophisticated system. Our second-stage cryogenic engines are ingeniously designed to not only harness their own fuel for propulsion but also to repurpose it for efficient cooling, introducing a potential avenue for reusable propulsion systems due to its ability to start-stop-start.The development of a reimagined aerospike nozzle, which, beyond its inherent efficiency advantages, provides a unique design that might allowing for precise adjustments and potential vectoring. Concurrently, the repurposing of cryogenic engine fuel utilization, enhances both coolant and overall fuel efficiency for the second stage, coming to a new era of resource optimization. The Redesigning and addition of structural enchantments may lead to achieving a lightweight configuration while concurrently elevating load capacity. The resulting reduction in weight, coupled with amplified thrust output and heightened efficiency, collectively positions this endeavor at the forefront of cutting-edge launch vehicle technology. This comprehensive initiative aspires to redefine the landscape of space exploration, introducing novel standards of efficiency and sustainability for future missions.