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COMPUTATIONAL STUDY OF AEROSPIKE ENGINES FOR REUSABLE ROCKET SYSTEMS

Abstract

Rocket systems such as SpaceX's "Falcon 9" are popularizing the concept of reusability within the rocketry and space launch industry. The technology of reusable rockets allows a rocket to launch and land back safely and be refurbished for a second flight, which dramatically decreases the costs of sending a payload to orbit. The engines of such rockets use conventional bell type nozzles; however, their performance has a huge scope of advancement. The "Altitude Compensating Rocket Nozzle" or Aerospike engine is capable of delivering the highest possible performance at every altitude within the atmosphere over axisymmetric rocket engines such as the conventional bell or cone type engines. Further, the aerospike engine often has a higher power to weight ratio also requiring less vehicle volume or a separate structural element to mount the engine to the vehicle. However, one of the key issues that the engine faces high heat transfer caused by its unconventional geometric design. The paper's objective is to analyze the heat transfer of "Altitude Compensating Rocket Nozzles" using computational tools and to propose solutions for its use in a reusable rocket system.

Keywords: Rocket Engines, Aerospike Engines, Reusable Rockets, Computational Study.