

ABSTRACT

FLOW PATH ANALYSIS OF A PRANDTL-MEYER ALL-EXTERNAL EXPANSION AEROSPIKE NOZZLE

In March of 2004, NASA Dryden Flight Research Center (DFRC) conducted flight research on an aerospike rocket in conjunction with the Air Force Flight Test Center, Blacksky Corporation, and Cesaroni Aerospace. Two aerospike rockets and one conventional rocket were successfully fired in both ground and flight tests. The results of these tests showed lower than expected thrust for the aerospike nozzle equipped motors, attributed to a deficiency in chamber pressure. This study examines the deficient chamber pressure as a direct result of a change in effective throat area for the aerospike nozzles motors, where such a change was hypothesized to be the result of an off nominal flow path or change in physical dimensions of the nozzle. The VULCAN CFD code was used to computationally investigate the flow through the nozzle throat.

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