

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
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COMPARISON STUDY OF LAUNCH VEHICLE CONTROL SURFACES AT SUPERSONIC SPEEDS
UNDER DIFFERENT CONFIGURATIONS USING COMPUTATIONAL ANALYSIS

Abstract

Launch Vehicles have been one of the earliest pioneers of the Aerospace industry, with the first successful launch in 1957, just a mere 54 years after Wilbur and Orville Wright conquered the skies. The space race cast the first innovations in the launch vehicle technology but in recent years there has been another major surge in the industry with the onset of the age of relaunch vehicles, with major advantage in economic and time scale factors more and more organizations are heading towards this direction but with that move there is a need to move to newer technologies that work both for launch and landing. It is important thus to know all the available two-way control surfaces and their performance characteristics under different regimes, this paper does tries to give a reasonable comparisinal study between the available technologies.

A computational study of planar, grid fin and swept back grid fin at two different configurations of 0 and 10 degree at supersonic speeds of Mach 2 and 3 is presented in this paper. The designs are compared on the basis of their moment coefficients at different scales and flow schemes in ANSYS Fluent software and their results are compared. Various validation studies are also presented including comparisinal study with other results and grid convergence system to authenticate the results. It is found that the swept back grid fins provide considerably better results but also produce more drag at a 5-degree sweep angle compared to other designs used.