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Numerical Analysis and Design Optimization of Lateral Jet Controlled Missile

Jae-Woo Lee, Byung-Young Min, Yung-Hwan Byun, Changjin Lee

Dept. of Aerospace Engineering, Konkuk University, Seoul, Korea

The aerodynamic analysis and the aerodynamic optimization study have been performed for the lateral jet controlled missile system. For the numerical investigation, a three dimensional Navier–Stokes computer code (AADL3D) has been developed by incorporating the Spalart-Allmaras one equation turbulence model. The developed analysis code has been validated through several supersonic examples. The behavior of the normal force and the pitching moment characteristics have been investigated through the numerical analyses for the different jet flow conditions, angle of attacks, circumferential jet nozzle locations and spouting jet angles. The results show different behavior of the normal force and moment variation according to each parameter. Based on the results of the aerodynamic analyses of the supersonic flow around lateral jet controlled missile for various jet and flow conditions, pitching moment and normal force are selected as the objective and constraint functions, and the flight Mach number, the angle of attack and the spouting lateral jet angle are selected as the design variables. By implementing the genetic algorithm for the global optimum, and the response surface method, the design optimization of the lateral jet controlled missile has been performed to find out the most effective flight conditions for the missile control.

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