

HIGH TEMPERATURE GAS EFFECT ON THE SUPERSONIC FLOW WITH APPLICATION IN NOZZLES

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Abstract

This work is to develop a new numerical computational program to determine the effect of using the gas of propulsion at high temperature on the calculation of the thermodynamic and geometric parameters, and application in supersonic nozzle divergent. The used selected gases are the H₂, O₂, N₂, CO, CO₂, H₂O, NH₃, CH₄ and air. All parameters depend on the stagnation temperature, supersonic Mach number and the used gas itself. The specific heat at constant pressure change with the temperature and the selected gas. The gas is still considered perfect. It is calorically imperfect and thermally perfect below the threshold of the molecules dissociation. A calculation of the error between the parameters of different gases with air is done for purposes of comparison.

Keywords: Supersonic Nozzle, High Temperature, Calorically Imperfect Gas, Numerical Integration, Trust, Specific Heat at Constant Pressure, Thermodynamical Parameters, Gas, Error