A CFD Study on 2D Ramjet jet intake Using OpenFoam

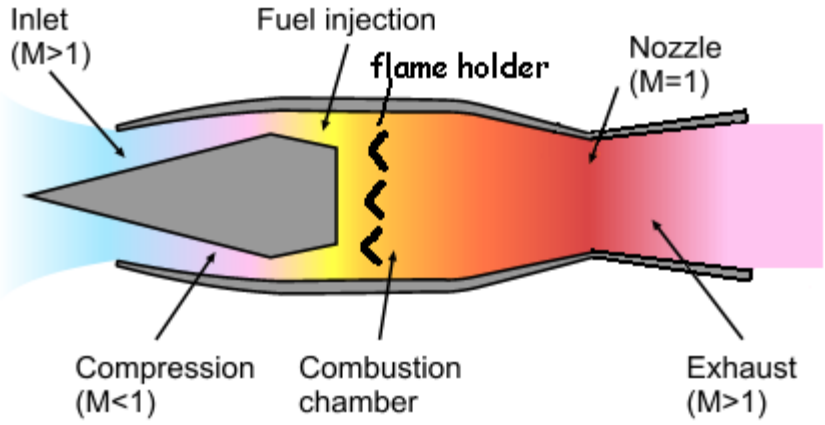
Abstract

Ramjet is one of the main source of power for supersonic flight. Ramjet powered missiles, Ram Rocket & Ramjet assisted supersonic fighter will lead the aviation sector into the near future. Ramjet sometimes referred to as flying stovepipe. It uses the engine's forward motion to compress incoming air without an axial compressor or a centrifugal compressor. Ramjet work most efficiently at supersonic speed around Mach 3. In this study we are going to simulate flow from rocket engine nozzle. The below image shows the internal diagram of ramjet engine.

Keywords: working of Ramjet Engine, CFD, OpenFOAM

Problem Statement

perform the simulated nozzle flow of Ramjet engine with the help of given parameters below.



Following are the initial conditions that you will need to perform the simulation

1) Chamber Pressure(pa) = 2.27E+06
2) Chamber Temperature(k) = 1200
3) Thrust = 1200
4) Mass Flow Rate = N/A

5) Altitude (m) = 7400

6) Coefficient of Heats(y) = 1.4

7) R = 350

References

1) OpenFoam User Guide
2) Kevin Raymond Holst, "A Method for Performance Analysis of a Ramjet Engine in a Free-jet Test Facility and Analysis of Performance Uncertainty Contributors"
3) Aircraft and Missile propulsion by Maurice Joseph Zucrow.