

Design and analysis of the convergent & convergent divergent nozzle for supersonic flow

Abstract

The proposed project is focused on study of the flow of various fluid through the nozzle which in future can be used for application in tokamak or plasma experimental systems for gas puffing nozzle. To carry out the project, we require the BE mechanical student for the following requirements.

Design of the Convergent Nozzle

Design of the Convergent- Divergent Nozzle

The design includes the calculation of the various diameters of the nozzle throat portion varies from 0.25-0.45mm & convergent length varies from 0.6-1mm with various divergent angles from 5 degree to 15 degree to get supersonic flow up to 5 Mach speed of air and hydrogen fluid which can be used in gas puffing in the tokamak.

The student has to carry out the CFD simulation to validate the nozzle parameters like velocity, pressure, temperature and Mach number for the both the fluid regime.

The student will compare the results for the various divergent angle for all parameters.

B:E mechanical student with three month project is sufficient enough to complete the project.

Final outcome of the project will be calculation sheet of excel with various variable parameters, graphs that represent the relationship of the throat area with respect to exit velocity, pressure, density etc. and Ansys CFD simulation with various parameters contours as validation of the calculation.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: B.E./B.Tech. Mechanical Engineering

3) Academic Project duration:

(a) Total academic project duration: 12 Weeks

(b) Student's presence at IPR for academic project work: 4 Full working Days per week

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