

Prediction of pressure, velocity distributions and visualization of flow patterns around NACA-2415 aerofoil for various angle of attack

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Abstract

Determining the aerodynamic characteristics of aerofoil profiles is an important practical problem of Computational aerodynamics. The aim of the proposed work is to predict pressure and velocity distributions around NACA-2415 aerofoil and visualize the patterns for different angle of attack for Mach number less than 0.3, which is incompressible flow. The openfoam results are compared with the Ansys results

Problem Statement

Simple foam (Steady-state solver for incompressible, turbulent flow, using the SIMPLE algorithm) will be used as the solver .The geometry and Flow domain shown in Fig. 1.

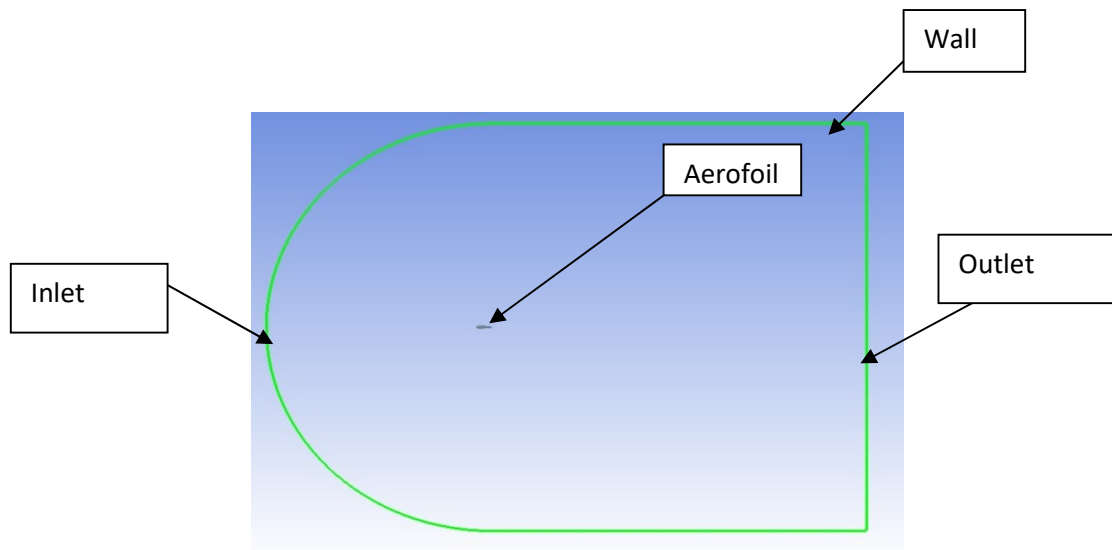


Figure 1. The geometry and Flow domain

The boundary conditions for the problem has stated below

- Inlet velocity $U = 27 \text{ m/s}$
- Angle of attack : $4^\circ, 8^\circ, 12^\circ, 16^\circ, 20^\circ$
- RAS Model : Spalart-Allmaras
- Kinematic viscosity: $1.714 \times 10^{-5} \text{ m}^2/\text{s}$
- Transport Model: Newtonian
- Solver: Simplefoam