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 aerofoil profile coordinates data available in the online library (Airfoil Tools website) and imported these coordinates into ANSYS design modular to create aerofoil geometry. ANSYS Fluent meshing will be use for generation of the computational meshes and Openfoam v6 used for the stimulating the case.

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.

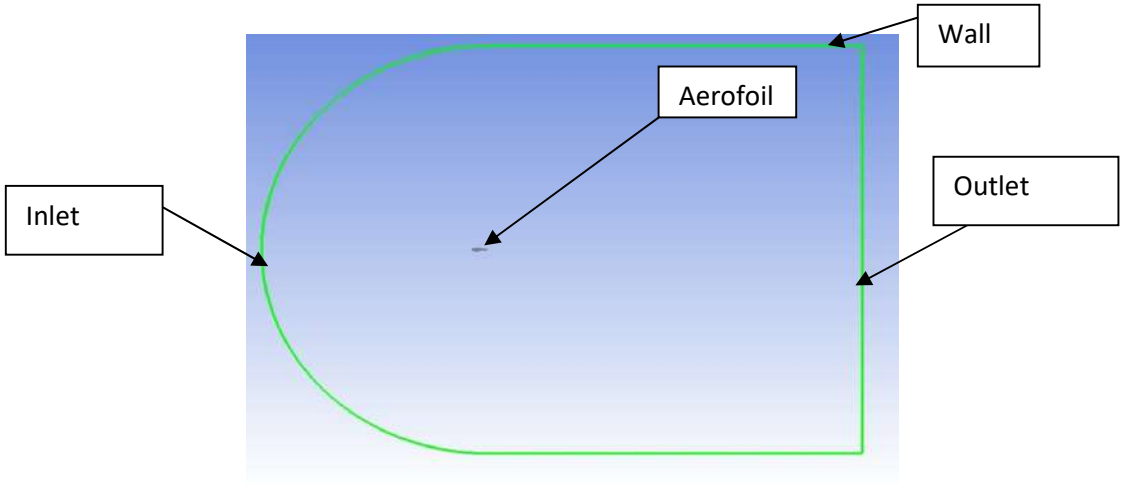

Figure 1. The geometry and Flow domain

The boundary conditions for the problem has stated below

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