



Synopsis

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Incompressible flow over a NACA 0012 airfoil profile

This research migration project aims to do numerical simulations of the flow over a NACA 0012 airfoil profile using OpenFOAM Version v2012. The geometry and mesh were defined using blockMesh utility. A steady-state, SIMPLE algorithm-based simpleFoam solver was used to simulate the problem. For accurate turbulence predictions, Spalart–Allmaras model were used and compared with the experimental data. Numerical calculations of the 2-D flow over the airfoil are presented, and results are compared against the results of two-dimensional wind tunnel tests of the symmetrical NACA 0012 airfoil reported in reference [1].

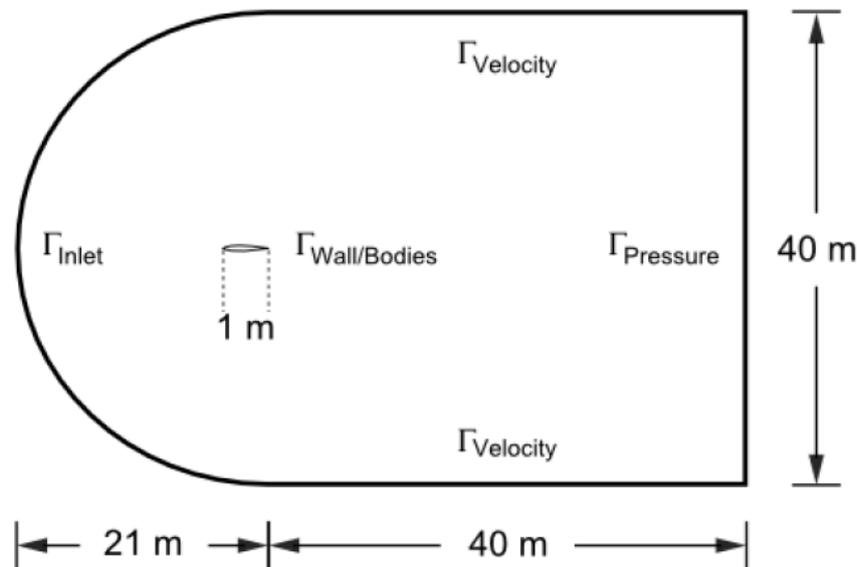


Figure 1: Geometry, Dimensions and Boundary condition

The dimensions of the geometry shown in the figure 1. The flow velocity is taken as 10m/s, resulting in a Mach number well below 0.3, and therefore the fluid model is assumed to be incompressible. Flowing fluid is entering from inlet with velocity of 10 m/s and exiting from outlet. Fluid properties and boundary conditions are discussed in the report.

Reference

1. Two-dimensional aerodynamic characteristics of the NACA 0012 airfoil in the Langley 8-foot transonic pressure tunnel. NASA Technical Memorandum 81927. 1981.