Aerodynamic Study On NACA0012 Aerofoil Based On Power Law Of Viscosity

Abstract

In this study conducted in Open foam and ANSYS software. This study includes all the data regarding aerofoil and angle of attack is maintained to zero degree. In aerodynamic aspect power law says,

$$\frac{\mu}{\mu_0} = \left(\frac{T}{T_0}\right)^{0.7}$$

It is the relationship between viscosity and temperature. Generally a power law is a functional relationship between two quantities, where a relative change in one quantity results in a proportional relative change in the other quantity: one quantity varies as a power of another. In this study drag and lift forces are analysed with varying the temperature and viscosity of fluid.

Problem Statement

CFD study on NACA0012 aerofoil. Estimating drag force and lift force for various working environment of fluid using Open foam and ANSYS software. Also, estimate coefficient of drag and coefficient lift. The Open foam results are compared with Ansys results.

Initial Data

Aerofoil Type: NACA0012

Angle of Attack: 0 deg.

Inlet velocity: 100 m/s

Mach Number: 0.3

Chord Length: 500 mm

Density of Air: 1.225 kg/m^3

Initial Viscosity of Air: 1.81×10^{-5} kg/(m.s)

Initial Temperature: 15℃

Solver Type: Simple Foam