

ABSTRACT

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This report aims to describe the calculation of Coefficient of Lift and Drag force which is produced by aerofoil using the software's like Salome (Pre-processing), OpenFoam, ParaView. This study includes all the data and comparison regarding aerofoil pressure and velocity which can be used to derive the C_d and C_l when it is subjected to different Angle of Attack.

Problem Statement

CFD Analysis of an Aerofoil NACA 4410 and Estimating its Coefficient of Lift and Drag

- Finding the Coordinate of NACA Aerofoil 4415 and importing it to Solidworks to make geometry with different Angle of Attack (AOA) ie. 0, 5, 16, 20, 25, 30.
- Modelling of Domain using Salome.
- Tetrahedral meshing using Salome.
- Running the case using Simple Foam Solver
- Study of Pressure over the Aerofoil.
- Calculating the Coefficient of Lift and Drag using Calculator.

Initial Data

Aerofoil Type: NACA 4415

Angle of Attack (pitch): 0, 5, 16, 20, 25, 30.

RAS-Model: Spalart Allmaras

Solver Type: Simple Foam

Inlet Velocity: 100m/s or 360km/hr

Mach Number: 0.2915

Chord Length: 1000mm

Thickness: 100mm

Density of Air: 1.6kg/mm³

Formula For calculation of Coefficient of Lift is

$$Lift = C_L \times S \times \left(\frac{1}{2} \times \rho \times v^2 \right)$$

C_L = Coefficient of Lift

S = Surface Area

ρ = Density of the Air (Altitude)

v = Velocity of the Air (TAS)

