SPC 307: Aerodynamics

Project Description

Due Date: 14 May 2017

Project Scope:

The project should include the CFD simulation of a subsonic external flow and comparing the simulation data with experimental results.

Project Requirements

- Project teams will be composed of 3 to 5 students
- Each group should choose a project (sample projects are provided below) and receive a written approval by the professor on the project by March 16, 2017.
- A written report should be written in a scientific paper format (you can download a word template from this link). The report due date is Sunday, 14 May 2016.
- Two Follow up reports should be submitted by April 1 and May 1. Each report grade weight is 10% of the project
- Oral Presentation will be conducted in the lecture by Sunday, 14 May 2017. Each group should present its project within 15 minutes in the lecture.

Two samples of the projects are shown in the following pages:

Sample Project 1

Wind Turbine Airfoil

Wind Turbine airfoil CFD analysis and validation with available experimental data listed below:

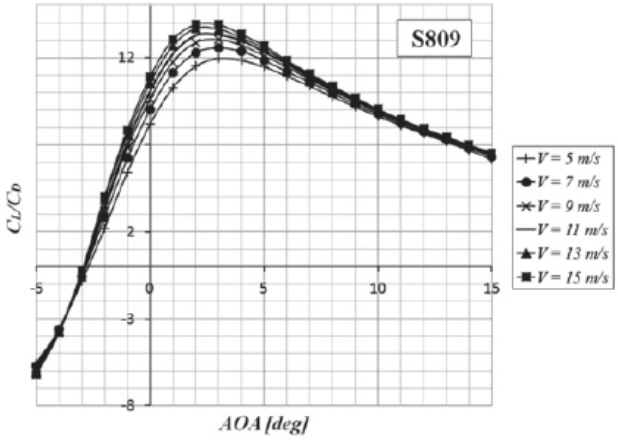
1. Mohamed A. Sayed, Hamdy A. Kandil, “Aerodynamic analysis of different wind-turbine-blade profiles using finite-volume method”, Energy Conversion and Management 64 (2012) 541–550, Volume 64, 2012, Pages 541–550.
2. Wolfe, “CFD calculations of S809 aerodynamic characteristics”, AIAA-97-0973, 1997.

Contents lists available at SciVerse ScienceDirect

Energy Conversion and Management

journal homepage: www.elsevier.com/locate/enconman

Aerodynamic analysis of different wind-turbine-blade profiles using finite-volume method



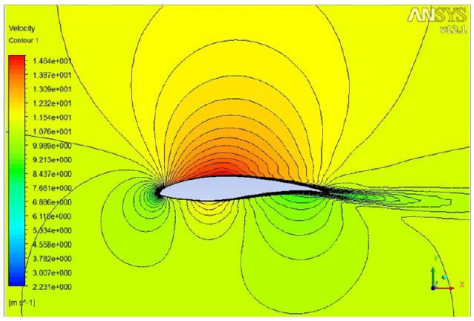


Fig. 10. Velocity contours for S826 profile at zero AOA and 11-m/s wind speed.

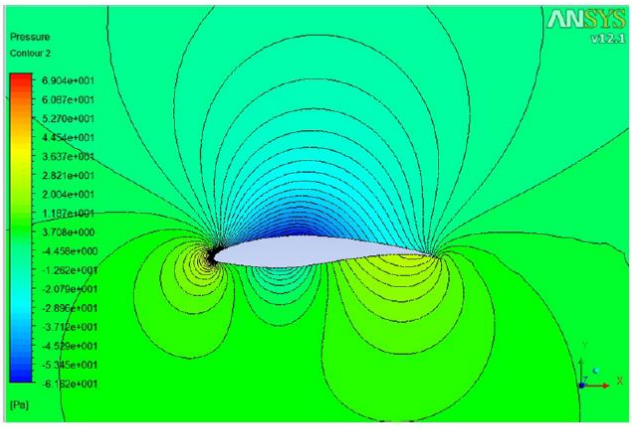
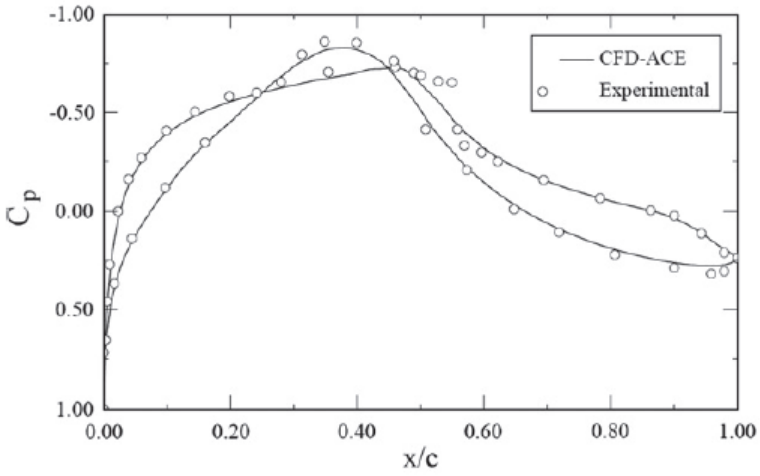


Fig. 11. Pressure contours for S826 profile at zero AOA and 11-m/s wind speed.



Requirements:

Plot Pressure coefficient around the upper surfaces of the airfoil and compare it with experimental data.

2. Calculate Lift and drag coefficients and compare it with experimental data.

3. Plot Pressure and velocity contours at different angle of attacks.

4. Plot he sliding ratio (C_L/C_D) at different angle of attacks.

You can download the papers from the following links:

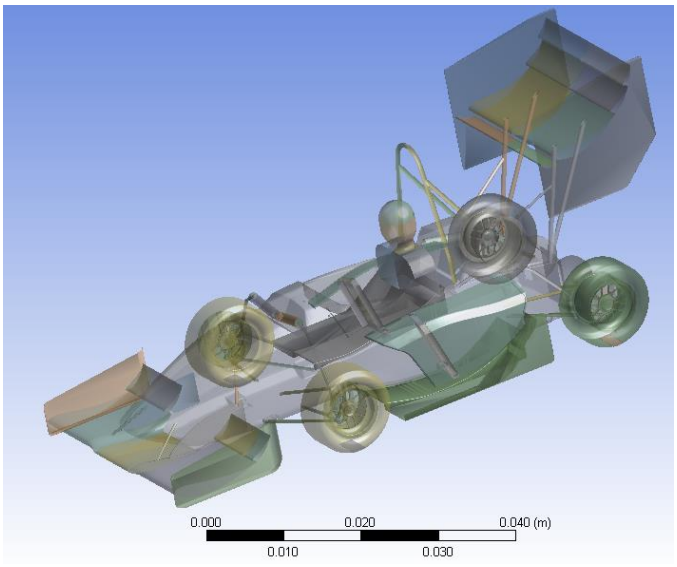
Sayed Paper Link

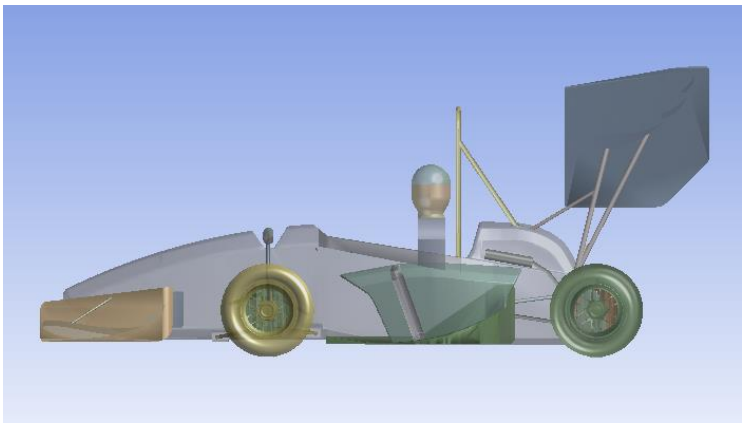
Wolfe Paper Link

Sample Project 2

Flow over a formula Car.

A 3d geometry of a formula car is shown below





Requirements

You should perform a 3D CFD simulation of the car showing

1. The pressure and velocity contours.

2. Calculate the Drag on the car.

You can download the geometry from

Car Geometry Link