

AerE344 Pre-Lab Assignment - Experiment Design Component

Lab # 01: Flow Visualization with Smoke wind Tunnel

DUE: At lab time for Lab Experiment # 01

You will need to finish this pre-lab assignment before you come to the wind tunnel laboratory to do the experiments.

What you will be given for your experiment:

- A Collins 690A-1 smoke tunnel to visualize the flow patterns as the airflow passes over 2-D and 3-D airfoils and blunt bodies.
- Various 2-D and 3-D airfoil models: Symmetrical airfoils and cambered airfoils.
- Blunt bodies: circular cylinder and flat plate.

What your experiment needs to produce:

- Your final product for this experiment is the sketch of the flow streamlines around the 2-D and 3-D airfoils and blunt bodies.
- Analyze the flow patterns around the airfoils at pre-stall and post-stall conditions
- Analyze the lift forces generated by the airfoils based on the observation of flow patterns around the airfoils.

What you need to turn in for this assignment:

- You should review and understand the concepts of Euler Approach and Lagrangian Approach to describe the motion of the fluid flow.
- You should review and understand the concepts of path lines, streak lines, and streamlines.
- You should understand the differences and connections between the concepts of path lines, streak lines, and streamlines.
- You should understand the concepts of blunt body, streamlined objects, angle of attack, attached flow, flow separation, airfoil stall, and wingtip vortex.