AerE344 Pre-Lab Assignment - Experiment Design Component

Lab #07: Quantifications of the Turbulence Characteristics in the Wake of an Airfoil by using a Hotwire Anemometer

Part #2: Airfoil measurements by using Hotwire Anemimeter Probe

In this lab you will be measuring velocity profiles just downstream of the trailing edge of the airfoil. You will be doing this to observe the boundary layer development over an airfoil.

What you must do BEFORE you come to the lab:

- Consider how thick the boundary layer might be at the downstream of the airfoil. From this thickness decide how far apart your measurement points in the wake should be.

You may estimate this thickness by assuming that the airfoil is a flat plate and using the equations below. You must then try to get as many data points within the boundary layer as possible.

- Assume transition occurs for Reynolds numbers of $\mathrm{Re}_x = \left(\rho V_\infty x\right)/\mu = 10^5$, where μ , the dynamic viscosity, can be assumed to be $1.8\times10^{-5}\ \frac{Ns}{m^2}$
- $\frac{\delta}{x} = \frac{5.0}{\sqrt{\mathrm{Re}_x}}$ for laminar flow
- $\frac{\delta}{x} = \frac{0.37}{\mathrm{Re}_x^{1/5}}$ for turbulent flow