Introduction to Wake Lab

• Learn to use a small wind tunnel, hot wire or film, pitot probe, and digital oscilloscope. Acquire data to a PC for later analysis.

• “Hot Wires, Wakes, and Drag Measurement” is the main handout on how to do the lab.

• The other handouts are background information on digital scopes, hot wires, etc.

• Does everyone know how to compute a power spectrum?
Wake Physics

• Look at Drag, by integrating wake. How do the measurements change with downstream location? With airfoil AOA? With tunnel speed? etc. How does the NACA0010 compare to the NACA2415?

• Look at the mean wake profiles. How do these change? Are they self-similar?

• Look at fluctuation profiles. Self-similar?

• Look at details of fluctuations. What do the spectra look like? Try the 1/8-in. and 1/16-in. cylinders in addition to the ½-in. diam. cylinder. Try the wire cylinders, even smaller. What happens at lower Reynolds no.?

• How does tunnel speed affect the wake?

• Can you scale distance and tunnel speed?
Issues with Performing the Labs

• You will need to study the information about the flow physics and equipment, before the lab

• There are more things that can be done in the labs than you will have time to do. Select a plan. Note that it will take time to learn and adjust the apparatus!

• All three pre-planned labs involve flow physics that cannot be computed very accurately at present; they address real issues that require experiments

• Save time for writing your report, in the usual format: Introduction, Apparatus, Results, Summary. See the suggestions on the website

• The second-week lab entry allows you to iterate once
Issues with Performing the Labs, 2

• We hope to make this course more of a project/tutorial course

• Pick up the ball and run with it! We will coach you

• We encourage interaction with Prof. Jewell and the TA, the Assistant TAs, and the other students

• We will try to drop by for a few minutes during each group’s lab time, just to see how things are going and to offer suggestions.

• "Recitation" schedule has been altered to place each group's recitation session with the class between their two 4-hour blocks of lab time, so feedback can be put to use!