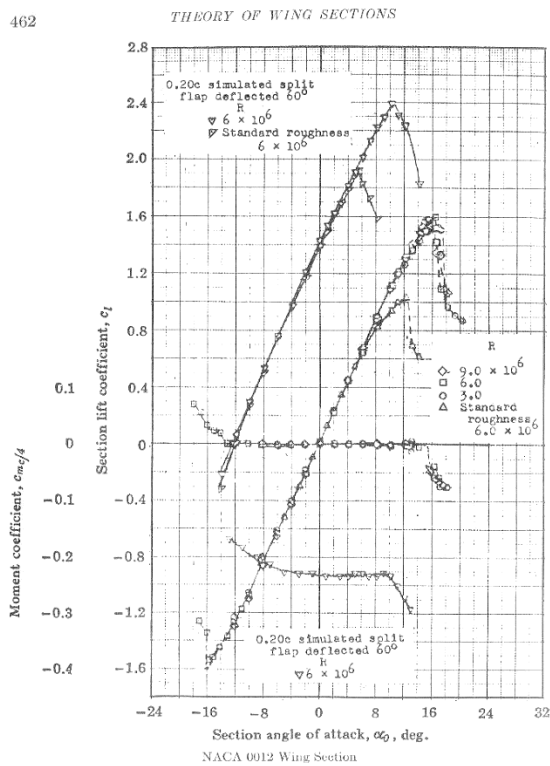


AEM 313 Problem Set #2

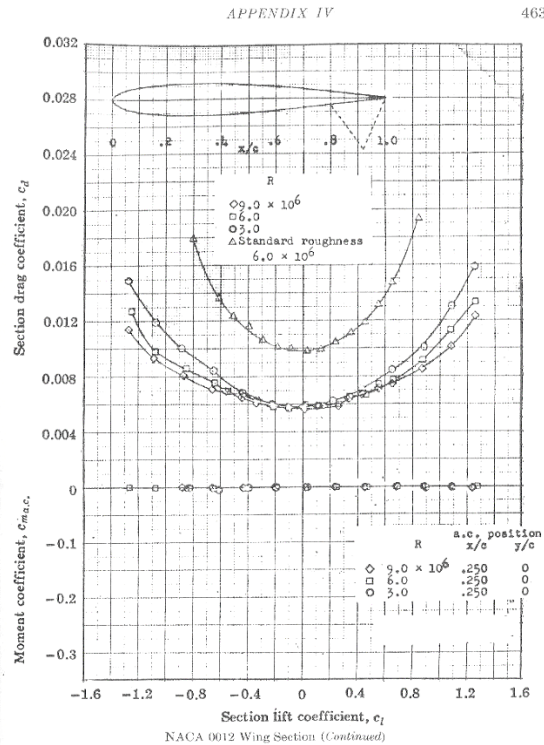
Due: 8th September 2017

1. Read Chapter 2 in AFe book.
2. For an NACA 0012 operating at a Reynolds number in excess of 10 million,
 - Determine the lift, drag, and quarter chord moment coefficient at 10° AOA.
 - Determine $C_{L_{max}}$ and discuss lift and moment behavior near stall.

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3. Variable density wind tunnels were a significant advance to allow testing of small models at full-scale aircraft Reynolds numbers.
 - For a 1/10th scale model, determine the air pressure necessary to match both the Reynolds number and Mach number at SSL for a given wind tunnel model.
 - Water is 1000 times denser than air. Is a model in a water tunnel feasible for matching both the Mach number and Reynolds number of a full size vehicle? What if the Mach number constraint is relaxed?
4. A Piper Cherokee 6 has a wing area of 174 sq-ft and a 300 horsepower engine.
 - Determine $C_{L_{max}}$ if at a gross weight of 3400 lbf, we observe a stall speed of 54 knots.
 - Determine the drag in pounds at 120 kts cruise at SSL at a weight of 3100 lbf. The drag coefficient is estimated as $C_D = 0.0358 + 0.054C_L^2$.
5. AFe 6th edition problem 2.30