Background

Airfoils are the cross sections of wings and rotors, so airfoil performance directly affects the performance of any lifting object. A simple way to analyze airfoils is by using a *panel method*. For this assignment, you will be utilizing a code produced by students in the FLOWLab called Xfoil.jl.

Assignment

1. Start a new branch on your repository. Name it something relevant to the project. Create issues for each of the following 9 steps of this assignment. Close them with a comment as you finish. each step.
2. Read through the Wikipedia article on *Aerodynamic potential-flow code.* Define words and include them in a dictionary that you'll include in an appendix in your report. Include images to illustrate meaning where applicable. Include equations where applicable to clarify and add meaning.
3. Complete the examples given in the Xfoil.jl documentation. Take notes on how the functions are used as you will be using them.
4. Explore the effect of airfoil angle of attack on airfoil lift, drag, and moment.
5. Compare data collected from XFoil to published data (experimental or other).
6. Explore the effect of airfoil thickness and camber on airfoil lift, drag., and moment.
7. Explore the effect of Reynolds number on airfoil lift, drag, and moment.
8. Write a report (paper) on your methods, results, and takeaways as described in the course syllabus. You should include discussion on what you learned steps 1-7. Focus on the relationships found steps 4-7.
   - Use the IMRAD format.
   - Use the provided AIAA conference paper template.
   - Comment all of the packages in the preamble so you know what they are doing.
9. Submit your code and paper via a pull request as described in the course syllabus.

Here are some words of use that you may want to include in your appendix dictionary:

- Coefficient of Drag, C_D
- Coefficient of Lift, C_L
- Coefficient of Moment, C_M
- Angle of Attack, α
- Airfoil Polar
- Stall

- Chord, c
- Camber
- Airfoil Thickness
- Freestream Velocity, V_∞
- Reynolds Number, Re
- Mach Number, M

Useful Resources

- Xfoil.jl Documentation
- ME 515 Textbook : Chapter 2 Sections 5 & 6
- XFoil Documentation
- Google