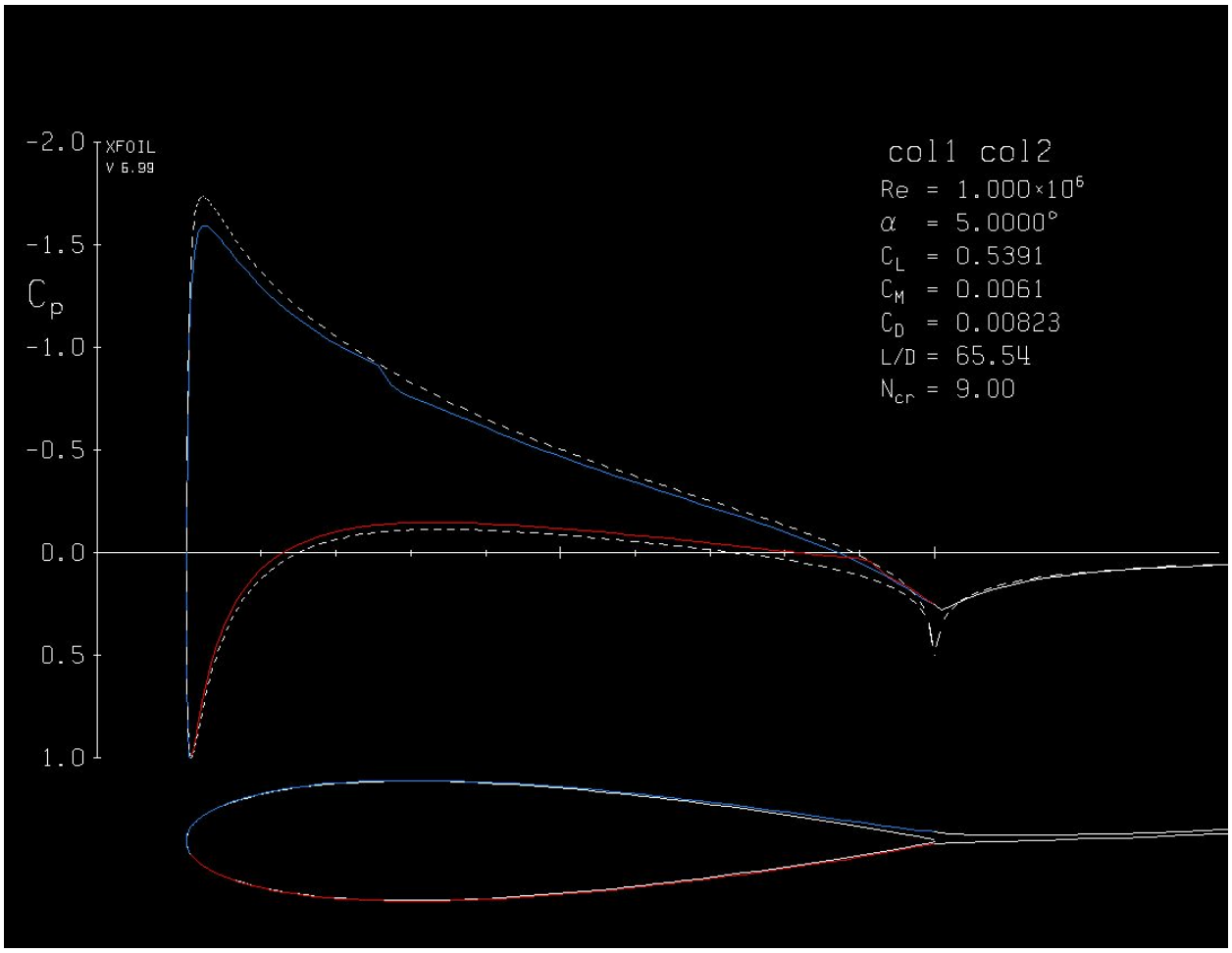
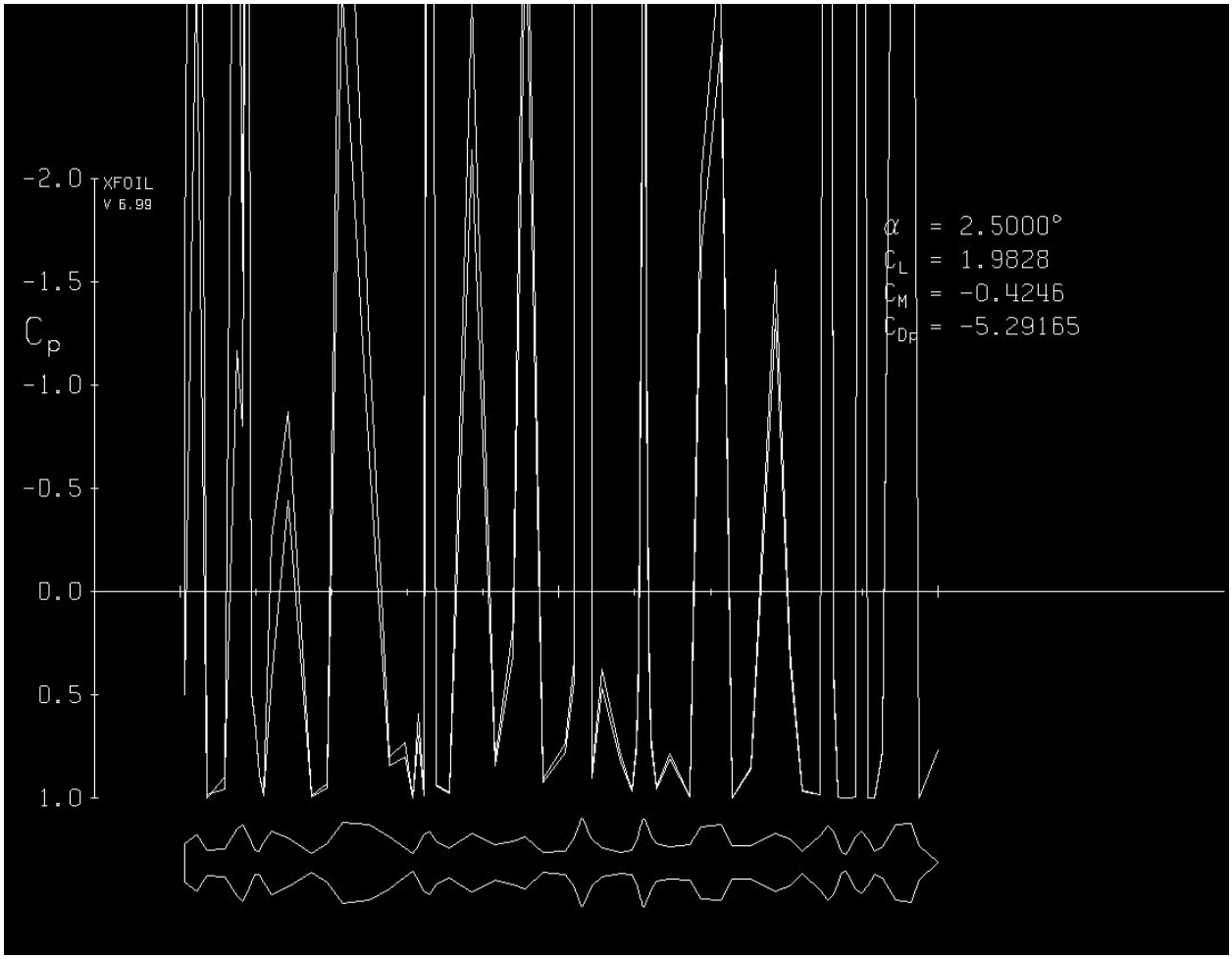
Background and Context

Evolutionary algorithms that develop something based on fitness and mating in a similar way to natural selection. Using these we are able to come up with nontrivial solutions to problems that have an unclear solution path. The problem we are trying to address is: Can we evolve an airfoil in order to maximize the coefficient of drag/lift?

An example of a viscous simulation of an existing airfoil



A first generation randomized airfoil:



To make this foil, we generate random points to define the shape of an airfoil, and we progressively evolve them based on the fitness of lowest drag.

The problem we are currently facing is how we should define the initial shape of the foil in order to evolve it more successfully.

A more detailed presentation for the background of our topic is in: https://docs.google.com/presentation/d/1rjRoPtGI3wuvY6WSo8gOFh5WctMp5K-aqPigVPD3ImQ/edit?usp=sharing

Key Questions

- What should we consider good airfoil? Is a lift/drag ratio good enough for evaluating fitness?
- Which evolutionary algorithm should we use?
    - Should we use a simple one or is it helpful to define how many move on each time?
- What shape should we start to evolve? A circle? A preexisting airfoil?

- Should we define points independently or use an equation to define the shape of the foil we evolve?
- Should we try to develop an evolutionary algorithm not used in DEAP?
- Which foil would be more interesting to consider, an asymmetric or symmetrical foil?

Agenda for Technical Review Session

Minute	**Plan**
0-1	Introduce Project
1-6	Discuss the current issue we are facing and receive feedback
6-10	Considerations of other evolutionary algorithms
10-15	Discuss how “good” a hydrofoil is. What does success for the foil look like?

Feedback Form

Our feedback form is linked below:
https://forms.gle/B16gs2hknq5UAsdD8

Program Architecture