Engineering Numerical Methods

Course:

- University of British Columbia, MECH 481 (Aircraft Aerodynamics)
- Senior year elective course for Mechanical Engineers
- Approx. 35 students in 7 teams

Activity Objectives:

- Apply a numerical method (potential flow analysis) to determine airflow patterns around an object
- Interpret and apply results to solve a real-world problem

Activity Duration:

- Several weeks
- Some class time for organizing / strategizing; detailed work done out of scheduled class time

Activity Details:

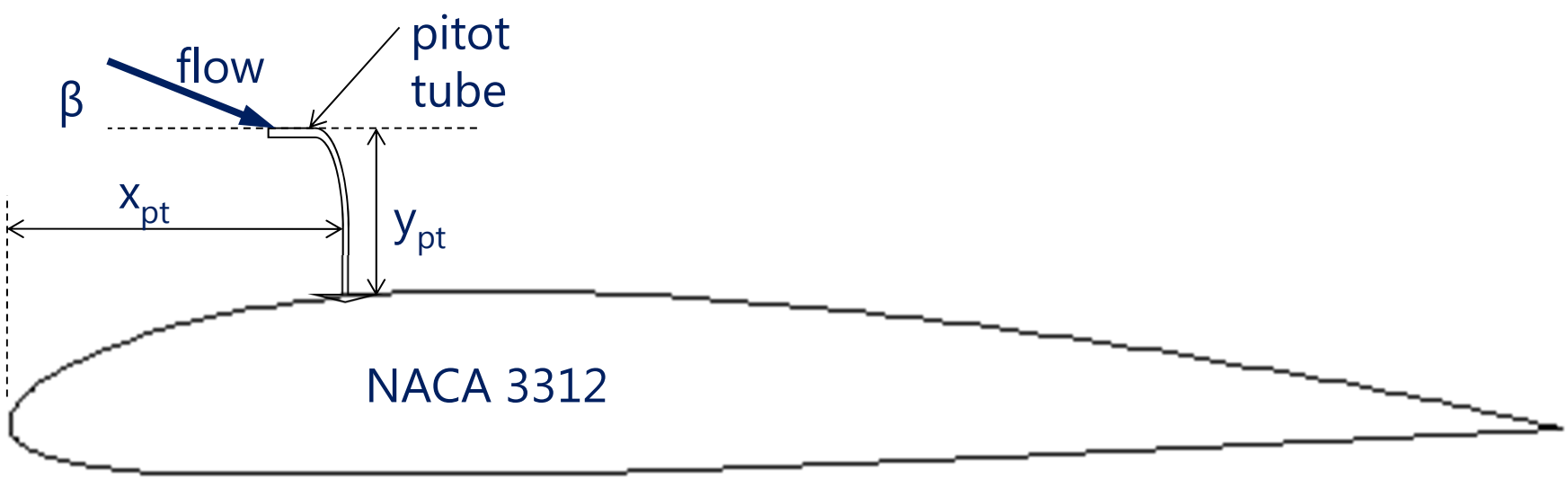
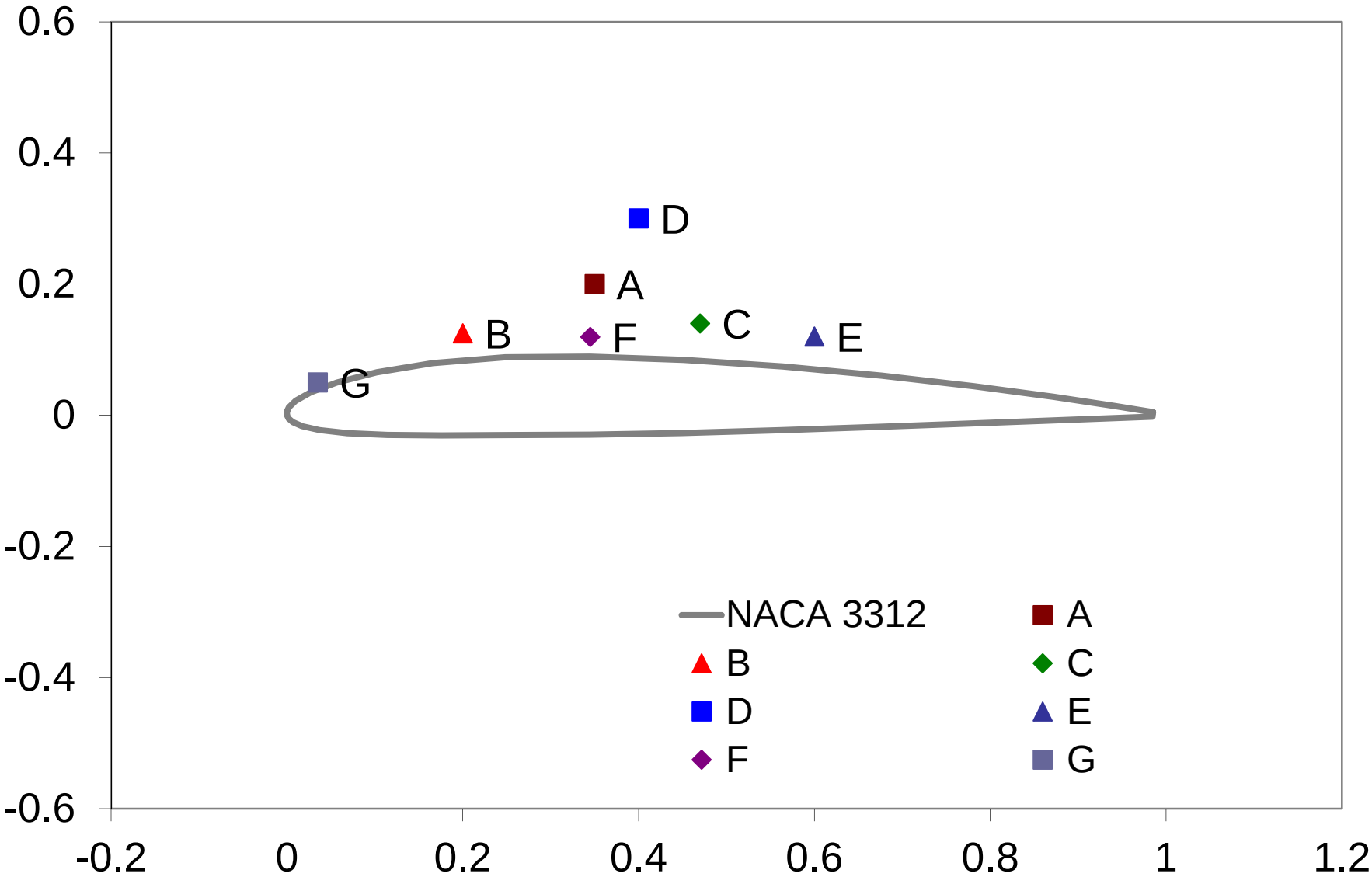
- Determine best location to place a pitot tube (an airspeed sensor) on a specified aircraft wing
- Computationally intensive problem requiring extensive use of software tools and computer programming (part of course learning outcomes)

Reporting and Debriefing:

- Teams reported their answer (i.e. their chosen coordinates for the pitot tube) to the instructor at the start of a debriefing class
- Coordinates were entered into Excel and a plot of the responses was shown (see "Results" slide)
- Discussion / debate / debrief followed

Potential Flow Exercise

- **Determine** the coordinates (x_{pt}, y_{pt}) at which you would place the pitot tube below to give the most accurate airspeed reading
  - Assume potential flow applies
  - Assume the pitot tube has 6 mm OD x 4 mm ID, and is accurate for $-4° < \beta < +4°$



Potential Flow Results