# GENERAL INFORMATION

**Program sponsor:** Princeton Environmental Institute  
**Position number:** E1SMI3  
**Project title:** Aircraft Drag and Noise Diminishment through Trailing Edge Vortex Suppression  
**Organization/research group:** Smits Fluid Mechanics Lab  
**Primary location(s) of internship:** Princeton University  
**Additional cities and/or countries to be visited (if applicable):** n/a

**Note:** If this internship is located in a country with an International SOS risk rating of High or Extreme, final candidates must participate in a travel review process overseen by the Travel Oversight Group (TOG), and obtain safety guidance prior to departure. The University reserves the right to revoke support and funding for travel at any time there has been a significant deterioration in the safety and security conditions surrounding travel arrangements, or in the sector of the country, or countries, where travel is to occur.

# FACULTY SPONSOR(s)/HOST INFORMATION

**Name(s):** Prof. Alexander Smits, Dr. Tyler Van Buren  
**University Department(s):** MAE  
**E-mail:** asmits@princeton.edu  
**Phone:** (609) 258-5117  
**Website:**

# INTERNSHIP/RESEARCH PROJECT INFORMATION

**Internship/project description:**  
Trailing edge vortices stem from the pressure difference between the upper and lower parts of a lifting surface. These vortices dictate aircraft flight schedules, through take-off and landing frequency; contribute to sound pollution through flap-edge noise; and significantly contribute to the fuel consumption of aircraft and automotive vehicles through induced drag. Here, we propose using active flow control devices---specifically oscillatory blowing and suction---to suppress the size and strength of these types of vortices. Experiments will be conducted in the water channel and subsonic wind tunnel at EQuad.

**Student's role and responsibilities:**  
The students on the project will have the following role/tasks:

(1) Design and manufacture an experimental apparatus that generates a generalized lift induced vortex, equipped with the ability to apply flow control strategies.

(2) Construct an experiment that allows for vortex measurement and visualization.

(3) With a research engineer, conduct experiments that can assess ability for modern flow control devices to suppress vortices.

(4) Analyze and interpret the findings.
Internship/project learning objectives:
By the end of the project, the students should have enhanced their abilities in:
(1) Model design and fabrication
(2) Mechanical design, construction, and operation of testing facilities.
(3) Scientific data acquisition and analysis
(4) Interpretation, communication, and dissemination of their scientific findings.

PROGRAM REQUIREMENTS
Academic background and any course pre-requisites:
Preferred: engineering, science

Technical skills:
Preferred: Matlab, CAD

Additional training(s):
Lab safety and laser safety training are required.

Equipment:
n/a

Physical demands:
n/a

Language abilities/competencies (if applicable):

Additional information about the internship/project:
Selected student(s) will need to complete lab safety training prior to the start of the internship.

INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)
Visa(s) required? Yes □ No □ Research permit/pass required? Yes □ No □ Immunizations required? Yes □ No □

INTERNSHIP/PROJECT SUPERVISOR(S)
Name and title of primary supervisor: Alexander Smits
Email: asmits@princeton.edu Phone: (609) 258-5117

Name and title of additional supervisor, if applicable: Tyler Van Buren
Email: tburen@princeton.edu Phone: (518) 867-9093

PROGRAM DATES AND FUNDING INFORMATION
Weekly Stipend: $500 Number of Positions Available: 2
Tentative Start Date (mm/dd/yyyy): 6/11/2019 Number of Weeks: 8-10
Tentative End Date (mm/dd/yyyy): 08/31/2019 Note: PEI funding is for full-time work, 35 hours per week minimum, and for a period of at least 8 continuous weeks.

Application Deadline: January 11, 2019