

Justin Cooke | Curriculum Vitae

248 S 21st Street Apt 3 – Philadelphia, PA – 19103

📞 +1 781 835 9054 • ✉ jpcooke@seas.upenn.edu
🌐 jcooke188.github.io

Research Interests

- **Fluid Dynamics:** Computational Fluid Dynamics, Turbulence, Low Reynolds Number Flows, Aerodynamics
- **Computational Science and Engineering:** Numerical Methods, High Performance Computing

Education

- **University of Pennsylvania** **Philadelphia, PA**
Ph.D. Mechanical Engineering, GPA: 3.72 *2019–Present*
- **University of Pittsburgh** **Pittsburgh, PA**
B.S. Mechanical Engineering, GPA: 3.58 *2014–2018*

Research Experience

- **University of Pennsylvania** **Philadelphia, PA**
Park Lab @ Penn *August 2019–Present*

Current Research Efforts: Conducting research on low Reynolds number flows for micro aerial vehicle flight (MAV). Current efforts involve design and development of propellers for MAVs, using a finite volume flow solver to analyze aerodynamic forces. Propeller design iterations with various geometric specifications are investigated to determine which characteristics are most favorable for MAV deployment. The present work is looking towards flight capability of insects as a means of inspiration for propeller geometry. Findings are currently being prepared for submission to an academic journal.

- **The Johns Hopkins University Applied Physics Lab** **Laurel, MD**
Air and Missile Defense Sector *June–August 2019*

Thermal-Fluid Analysis: Investigated, under the guidance of two task leads in thermal and fluid analysis sections, reasoning for inconsistencies between temperature data gathered in the field, and computational results. Created a numerical model of a bare-wire thermocouple to explore effects of different modes of heat transfer not considered by the simulation. Utilized Abaqus to create a second thermocouple model to find a wall temperature. Found the heat transfer coefficient, h , for the environment, by running two CFD cases. Adjusted an existing mesh using Pointwise to allow for higher accuracy at desired points along environment wall. Data was extracted and then used in conjunction with the thermocouple models to create a post-processing method to allow for better understanding of the actual environment temperature. Findings and results were

discussed with both task leads, and a technical presentation summarizing my findings was also presented to the project sponsor.

University of Pittsburgh

Pittsburgh, PA

○ *Dr. Babaee's Research Lab*

May 2017–December 2018

Vertical Ellipse Correlation: Worked in a team investigating the possibility of a correlation between Reynolds Number, Re , and Rayleigh Number, Ra , for a vertical ellipse. It is known that an existing correlation exists for a cylinder, so investigation into similar geometries was conducted. I ran high fidelity simulations, accessing remotely high performance computers through a Linux based software. Data was extracted from the simulations, used to visualize high fidelity simulations, and then to create a relationship between Re and Ra . Findings were presented to the rest of the team.

Teaching Experience

University of Pennsylvania

Philadelphia, PA

○ *MEAM 203: Thermodynamics*

January–May 2021

Remotely led recitations twice per week and held office hours twice per week, using Zoom. Deployed an active learning style where students were encouraged to provide assistance in solving problems. Also assisted with exam and quiz grading.

University of Pennsylvania

Philadelphia, PA

○ *MEAM 302: Fluid Dynamics*

August–December 2020

Remotely led one recitation per week, and held office hours twice per week, using Zoom. Utilized a passive learning style during recitations where example problems were completed step-by-step, and students would ask questions as the problem was solved. Assisted in exam creation and grading.

Projects

University of Pittsburgh

Pittsburgh, PA

○ *Thermal FEA Study on Eaton Busway in Extreme Ambient Conditions* *August–December 2018*

Senior Design Capstone Project: Worked in a team to conduct a thermal finite element analysis study on Eaton's busway product line to determine de-rate factors. De-rate factors dictate the allowed current, and ultimately power, that can be relayed through busway. I developed a function for internal heat generation that related it to current, resistivity of material, and the cross sectional area of the current path. The team used this information to conduct the study using ANSYS Workbench software. De-rate factors were determined and findings were summarized in a poster presentation at the University's Design Expo.

Leadership

B.R.O.T.H.E.R.H.O.O.D.

Pittsburgh, PA

○ *Co-Captain and Webmaster*

May 2016–December 2018

Co-Captain: Led alongside the Captain of the current executive board, known as the foundation. I coordinated all planning meetings for the foundation, and assisted in creating personal development

workshops for historically underrepresented men in engineering. I led workshops alongside other members of the foundation, directing open and honest conversation, and communicating personal lessons learned.

Webmaster: I formatted, organized, and updated the organization's website. I implemented all necessary changes and communicated the organization's goals and mission.

- **Society of Hispanic Professional Engineers** **Pittsburgh, PA**
President *May 2016–May 2017*

President: I coordinated and executed planning meetings with the executive board, general body meetings, and community outreach events. Effectively led many successful industry sponsored events. Coordinated and delivered to SHPE National the reporting program, resulting in the chapter winning Small Chapter of the Year Award at the 2017 National Convention.

Prior Roles: I served as Freshman Chair and Secretary with the chapter. I acted as a liaison to the freshman class and the executive board to aid in recruitment and retention of freshman students. I recorded meeting minutes, communicated events and updates in emails to the general body, and coordinated the calendar in conjunction with other student organizations on campus to avoid scheduling conflicts.

Honors and Awards

- **DoD: Science Mathematics and Research for Transformation (Declined)** 2021
- **National GEM Consortium: GEM Full Fellow** 2019
- **Swanson School of Engineering Dean's Honors List:** Fall 2015, Summer 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018
- **National Science Foundation Global Engineering Preparedness Scholarship** Fall 2014

Skills

- **Language:** Spanish: Reading and Writing (Intermediate), Speaking (Basic)
- **Programming Languages:** Fortran (Basic), C++ (Basic)
- **Software:** Microsoft Office (Advanced), Paraview (Basic), Pointwise (Basic), Tecplot (Basic)
- **Data Analysis:** Matlab (Advanced)
- **Miscellaneous Skills:** 3D Printing, Laser Engraving, Digital Design, Leadership, Brainstorming