

CRISTIAN LACEY

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Education

Princeton University

PH.D. IN MECHANICAL AND AEROSPACE ENGINEERING, ADVISOR: **MICHAEL E. MUELLER**, GPA: **4.00/4.00**

Princeton, NJ

Expected May 2023

The Cooper Union

B.E. IN MECHANICAL ENGINEERING, GPA: **3.98/4.00**

New York, NY

May 2018

Honors

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| 2019 | Sayre Award for Academic Excellence , Highest-ranking graduate student after first year. | Princeton University |
| 2019 | Daniel and Florence Guggenheim Foundation Fellowship , Competitive second-year fellowship. | Princeton University |
| 2018 | Gordon Y. S. Wu Fellowship in Engineering , Competitive first-year fellowship. | Princeton University |
| 2018 | Henri D. Dickinson Award , Highest cumulative ranking upon graduation. | The Cooper Union |
| 2018 | Alexander C. Grove Memorial Prize , For scholarship, personal integrity, and professional promise. | The Cooper Union |
| 2018 | The Mechanical Engineering Design Prize , For excellence in mechanical design. | The Cooper Union |
| 2016 | Tyler G. Hicks Mechanical Engineering Prize , For academic achievement during the first two years. | The Cooper Union |
| 2015 | Howard Silfin Mechanical Engineering Internship Award , For ability to conduct quality research. | The Cooper Union |
| 2014 | Half-tuition scholarship , Merit scholarship for all four years. | The Cooper Union |

Peer-Reviewed Publications

- **Lacey, C.E.**, Novoselov, A.G., Mueller, M.E., In-Situ Adaptive Manifolds: Enabling computationally efficient simulations of complex turbulent reacting flows, *Proceedings of the Combustion Institute* 38 (2019) submitted.
- Novoselov, A.G., **Lacey, C.E.**, Perry, B.A., Mueller, M.E., Large Eddy Simulation of a turbulent lifted flame using multi-modal manifold-based models: Feasibility and interpretability, *Proceedings of the Combustion Institute* 38 (2019) submitted.

Conference Papers & Presentations

- Baglione, M., Chin, A., Faddoul, R., **Lacey, C.E.**, Mosin, A., Rundell, J., Zhang, O., Optimizing condenser water supply temperature to minimize energy usage, 2020 ASHRAE Winter Conference, Orlando, FL, February 1-5, 2020.
- **Lacey, C.E.**, Novoselov, A.G., Mueller, M.E., In-Situ Adaptive Manifolds: Enabling simulations of complex turbulent reacting flows, 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, WA, November 23-26, 2019.
- Novoselov, A.G., **Lacey, C.E.**, Mueller, M.E., Large Eddy Simulations of turbulent flames using two-dimensional reduced-order manifold models, 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, WA, November 23-26, 2019.
- Wei, H., Bianco, V., **Lacey, C.E.**, Trubatch, A.D., Yecko, P.A., Experimental quantification of volume loss rate and flow dynamics due to a magnetically localized fluid region in a laboratory model blood vessel flow (Poster), 12th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Copenhagen, DK, May 22-26, 2018.

Research

High-Fidelity Manifold Modeling of Turbulent Combustion

Princeton, NJ

PRINCETON UNIVERSITY

Jan. 2019 - Present

- Integrating In-Situ Adaptive Tabulation (ISAT) algorithm into multi-modal manifold modeling code, enabling more efficient on-the-fly lookups and less computationally expensive turbulent combustion simulations.
- Simulating multiple nonpremixed and partially premixed jet configurations to determine regimes of applicability of different physically-derived reduced-order (PDRs) manifold models.
- Conducting performance assessment of ISAT implementation.
- Validating results through comparison with experimental measurements.

Magnetic Nanoparticle Feedback Control System

THE COOPER UNION

New York, NY

Sept. 2017 - May 2018

- Investigated using a magnetic control system to direct drug-coated magnetic nanoparticles to disease targets, increasing the effectiveness of treatments like chemotherapy while decreasing the side-effects.
- Designed and constructed an experimental setup comprising a closed-loop flow channel, nanoparticle cluster, webcam, stepper motors, and electromagnets on rails.
- Wrote a Python program using OpenCV to track the location of a nanoparticle cluster in real-time.
- Programmed an Arduino to actuate stepper motors and vary electromagnet strength in feedback control loop.

Employment

Smith Engineering, PLLC

ENGINEERING INTERN

New York, NY

May 2017 - Apr. 2018

- Trained predictive models in Microsoft Azure Machine Learning Studio.
- Integrated machine learning models with a local PI database using Python and API requests.
- Prepared screens in PI Vision for real-time data visualization.
- Wrote Python programs to scrape data using API requests and WebDrivers.
- Built Con Edison electric and steam rate structures in MATLAB.

Projects

Genetic Algorithm for Structural Design and Topological Optimization

PRINCETON UNIVERSITY

Princeton, NJ

Nov. 2018 - Jan. 2019

- Developed a Python package that employs a genetic algorithm to optimize truss structures.
- Versioned with Git and coordinated with team to proactively avoid merge conflicts.
- Leveraged Coveralls and Codacy for code coverage evaluations and linting.
- Generated automatic documentation with Sphinx and Read the Docs.

Analysis and Design of a Wind Turbine Tower

THE COOPER UNION

New York, NY

Oct. 2017 - Nov. 2017

- Designed wind turbine tower to satisfy strength and deflection specifications.
- Modeled tower geometry in SolidWorks.
- Meshed solid geometry in ANSYS Meshing.
- Simulated design in ANSYS APDL and Workbench.
- Documented results in final report and delivered presentation.

CFD Analysis and Design of a Turbojet Compressor

THE COOPER UNION

New York, NY

Apr. 2017 - May 2017

- Designed compressor stage of a turbojet engine to satisfy pressure and compression ratio specifications.
- Modeled compressor geometry in BladeGen and SolidWorks.
- Meshed solid geometry in HyperMesh and ANSYS Meshing.
- Simulated design transiently in ANSYS Fluent and performed post-processing in CFD-Post.
- Documented results in final report and delivered presentation.

Skills

Software	ANSYS Fluent, ANSYS APDL, HyperMesh, SolidWorks, AutoCAD, MATLAB.
Languages	Python, C, Fortran.
Tools	Make, Git, Mercurial, UNIX command-line, \LaTeX .
IoT	Raspberry Pi, Arduino.

Memberships

Honor Societies	Tau Beta Pi.
Professional Associations	APS DFD, ASME.