

EDUCATION

Cornell University

B.S. in Mechanical Engineering

Ithaca, NY

2013–2017

Virginia Tech

Ph.D. in Engineering Mechanics

Advisor: Mark A. Stremler

Thesis title: *Vortex Dynamics and forces in the laminar wakes of bluff bodies*

Blacksburg, VA

2018–present

PUBLICATIONS

- [1] **Emad Masroor** and Mark A. Stremler. “On the topology of the atmosphere advected by a periodic array of axisymmetric thin-cored vortex rings”. In: 00.0 (Dec. 2021), pp. 1–15. DOI: [10.0000/S1560354700000012](https://doi.org/10.0000/S1560354700000012). arXiv: [2112.06105](https://arxiv.org/abs/2112.06105).
- [2] Wenchao Yang, **Emad Masroor**, and Mark A. Stremler. “The wake of a transversely oscillating circular cylinder in a flowing soap film at low Reynolds number”. In: *J. Fluids Struct.* 105 (Aug. 2021), p. 103343. ISSN: 08899746. DOI: [10.1016/j.jfluidstructs.2021.103343](https://doi.org/10.1016/j.jfluidstructs.2021.103343). arXiv: [2101.00108](https://arxiv.org/abs/2101.00108).
- [3] Mark A. Stremler, Saikat Basu, and **Emad Masroor**. “Erratum: Streamline patterns in 2P vortex street equilibria”. In: *Journal of Fluid Mechanics*, 901 (2020). ISSN: 14697645. DOI: [10.1017/jfm.2017.563](https://doi.org/10.1017/jfm.2017.563).

PRESENTATIONS

- [1] **Emad Masroor** and Mark A. Stremler. “Vortex patterns in the wake of a transversely oscillating circular cylinder at low Reynolds number”. In: *74th Annual Meeting of the APS Division of Fluid Dynamics*, Pheonix, AZ [\[file\]](#). Nov. 2021.
- [2] Mark A. Stremler and **Emad Masroor**. “A generalized Karman-like drag law for exotic vortex street equilibria”. In: *74th Annual Meeting of the APS Division of Fluid Dynamics*, Pheonix, AZ. Nov. 2021.
- [3] **Emad Masroor** and Mark A. Stremler. “Theoretical predictions for the drag force due to exotic wakes”. In: *25th International Congress of Theoretical and Applied Mechanics*, Milan, Italy (virtual). Aug. 2021.
- [4] Emadi Masroor and Mark A. Stremler. “Understanding the occurrence of the ‘2P mode’ in the wake of an oscillating cylinder at low Re”. In: *Inaugural Engineering Mechanics Symposium, Blacksburg VA*. Apr. 2021.
- [5] **Emad Masroor** and Mark A. Stremler. “Drag forces on a bluff body shedding a 2P wake”. In: *Fall Fluid Mechanics Symposium*, Blacksburg, VA. Nov. 2019.
- [6] **Emad Masroor** and Mark A. Stremler. “Drag forces on a bluff body shedding a 2P wake”. In: *72nd Annual Meeting of the APS Division of Fluid Dynamics*, Seattle, WA. Nov. 2019.
- [7] **Emad Masroor**, Wenchao Yang, and Mark A. Stremler. “Vortex patterns in the two-dimensional wake of a transversely oscillating cylinder in uniform flow”. In: *IUTAM Symposium on Vortex dynamics in science, nature and technology*, San Diego, CA. June 2019.
- [8] **Emad Masroor**, Wenchao Yang, and Mark A. Stremler. “Wake Structure of an oscillating cylinder in a flowing soap film at low Reynolds number”. In: *71st Annual Meeting of the APS Division of Fluid Dynamics*, Atlanta, GA. Nov. 2018.

- [9] Wenchao Yang, **Emad Masroor**, and Mark A. Stremler. “Vortex patterns in the two-dimensional wake behind an oscillating cylinder”. In: *Fall Fluid Mechanics Symposium*, Blacksburg, VA. Nov. 2018.
- [10] Mark A. Stremler et al. “Classifying Relative Vortex Motions in 2P Mode Wakes”. In: *7th Conference on Bluff Body Wakes and Vortex-Induced Vibrations*, Marsielle, France. July 2018.

PROJECTS

SimpleNavierStokes.jl (2020)

A [Julia package](#), [blog post](#), and open-source [notebook](#) to serve as a beginner's tutorial for writing incompressible Navier-Stokes solvers using the $\omega - \psi$ formulation.

EXPERIENCE

Virginia Tech

Member, *Theoretical & Applied Fluid Mechanics* research group

Blacksburg, VA
Spring 2018 –present

- Hydrodynamics experiments with flowing soap films
- ‘Reduced order modeling’ of exotic wakes using point vortex dynamics
- Dynamics of vortex rings
- Design & prototyping of a novel design for an atomizing nozzle for an industry partner.

Regeneron Pharmaceuticals

Ph.D. Intern

Tarrytown, NY
Summer 2021

- Conducted multiphase simulations of bioreactors using ANSYS Fluent.
- Helped identify thresholds for operating bioreactors at low-volume conditions
- Created a framework for reliably conducting in-house CFD simulations of bioreactors

Toyota Material Handling (Raymond Corp.)

Intern Research Engineer

Greene, NY
Summer 2016

- Spearheaded a project for testing the feasibility of switching forklift trucks from legacy lead-acid batteries to Lithium-Ion batteries.
- Designed and conducted preliminary experiments which would allow Raymond to monitor the on-field performance of the hydraulic systems in its lift trucks through telematics software already in use.
- Modeled the mast of a forklift truck under extreme loading conditions using Abaqus, in order to investigate the effect of changing the thickness of hydraulic cylinders.

Cornell Mars Rover Project Team

Task Systems team member

Ithaca, NY
Fall 2013 –Spring 2016

- Work with a team of 40 students from different engineering disciplines, who collaborate to design, build, and remotely operate a fully-functioning mock Mars Rover at an annual competition in Utah.
- Used SolidWorks to design assemblies and prepare shop drawings with tolerances. Fabricated aluminum parts in machine shop using mill and lathe.
- Built a different subsystem each academic year: wrist joint, elbow joint, and end effector (robotic hand).

Cornell University

Various positions:

Ithaca, NY

- *Writing tutor* Knight Institute for Writing in the Disciplines Fall 2014 –Spring 2017
- *Student employee* Office of Institutional Research & Planning Spring 2016
- *Member* Student Library Advisory Council Spring 2016
- *Staff Design Editor* The Cornell Daily Sun May 2014 –December 2014
- *Student worker* Cornell Dining January 2014 –October 2014
- *Desk staff* Cornell University Library Fall 2014 –Fall 2015

TEACHING

- **Instructor** at Duke Talent Identification Program
Engineering Problem Solving

Summer 2018 & 2019

Graduate Teaching Assistant at Virginia Tech:

- *Computational Methods* at Sophomore level Spring 2018
- *Introduction to Fluid Mechanics* at Junior level Fall 2018
- *Dynamics* at Sophomore level Spring 2019
- *Introduction to Solid Mechanics* at Graduate level Spring 2019

Teaching Assistant at Cornell University:

- *Water & Wind Energy Module* Fall 2016
- *Analysis of Mechanical and Aerospace Structures* Fall 2016

SKILLS

- **Programming:** Julia, Python, Matlab, C/C++, Mathematica
- **Comp. Phys:** [Basilisk](#), OpenFOAM, ANSYS, Abaqus
- **Engineering:** SolidWorks, AutoCAD, mill & lathe, 3-D printing, LabVIEW
- **Tools:** TensorFlow, Bash, Git, LaTeX, [Nextjournal](#)
- **Web:** Markdown, YAML, Jekyll

COURSEWORK

- **CFD:** Computational Fluid Dynamics & Heat Transfer, Computational Methods for Viscous Flows, Reduced Order Models for Fluids
- **Math:** Perturbations, Advanced Dynamics, Chaos & Nonlinear Dynamics, Mathematical Fluid Dynamics, Complex Analysis, Partial Differential Equations
- **Fluids:** Ideal Flow, Turbulence, Applied Fluid Mechanics, Continuum Mechanics, Science Guided Machine Learning

SCHOLARSHIPS AND AWARDS

- National Science Foundation Graduate Research Fellowship 2019–2023
- Manuel Stein Scholarship, Engineering Mechanics Program, Virginia Tech Spring 2019
- Liviu Librescu Memorial Fellowship, Engineering Mechanics Program, Virginia Tech Spring 2020
- Daniel and Frances Frederick Fellowship, Engineering Mechanics Program, Virginia Tech Spring 2022
- College of Engineering Fellowship, Virginia Tech, Spring 2018
- International Student Tuition Scholarship, Cornell University, 2013 –2017
- James E. Rice Jr. Award for exceptional writing in first-year writing seminars, Cornell University, 2014

SERVICE

- Reviewer, *Progress in Computational Fluid Dynamics*
- Member, American Physical Society
- Member, Society for Industrial and Applied Mathematics
- Member, American Mathematical Society
- Member, Society for Integrative and Comparative Biology
- Reviewer, GSA Travel Fund Program Spring 2018
- Judge for Blue Ridge Highlands Regional Science Fair Spring 2020