

## EDUCATION

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### 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

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- [1] **Emad Masroor**, Wenchao Yang, and Mark A. Stremler. “Flow visualization data from experiments with an oscillating circular cylinder in a gravity-driven soap film”. In: *Data in Brief* 41 (Apr. 2022), p. 107819. ISSN: 2352-3409. DOI: [10.1016/J.DIB.2022.107819](https://doi.org/10.1016/J.DIB.2022.107819).
- [2] **Emad Masroor** and Mark A. Stremler. “On the topology of the atmosphere advected by a periodic array of axisymmetric thin-cored vortex rings”. In: *Regular and Chaotic Dynamics* 27.2 (2022), pp. 183–197. DOI: [10.1134/S1560354722020046](https://doi.org/10.1134/S1560354722020046). arXiv: [2112.06105](https://arxiv.org/abs/2112.06105).
- [3] 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).
- [4] 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

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- [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*, Marseille, France. July 2018.

## EXPERIENCE

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### 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

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- **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

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- **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

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- **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

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- 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

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- 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