Emad Masroor

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Education

Cornell University — Ithaca, NY
B.S. in Mechanical Engineering — 2013–2017

Virginia Tech — Blacksburg, VA
Ph.D. in Engineering Mechanics — 2018–present
Advisor: Mark A. Stremler
Thesis title: *Vortex Dynamics and forces in the laminar wakes of bluff bodies*

Publications

[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.

[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. arXiv: 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. arXiv: 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.

Presentations

[1] **Emad Masroor**, Anshul Nayak, and Hodjat Pendar. "A computationally efficient method for modeling the dynamics of swimming or flying flexible bodies in high-Re flows". In: *2nd annual Engineering Mechanics Symposium, Blacksburg VA*. Apr. 2022.

[2] **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.

[3] 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.

[4] **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.

[5] **Emad 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.

[6] **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.

[7] **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.

[8] **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.

[9] **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.

[10] 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.

[11] 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.

Experience

Virginia Tech — Blacksburg, VA
Member, *Theoretical & Applied Fluid Mechanics* research group — 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 — Tarrytown, NY
Ph.D. Intern — 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.) — Greene, NY
Intern Research Engineer — Summer 2016

- Experimentally tested the feasibility of switching forklift trucks from legacy lead-acid to Li-ion
- Conducted preliminary experiments to monitor the on-field performance of hydraulic systems using telematics
- Modeled the mast of a forklift truck under extreme loading conditions using Abaqus

Cornell University — Ithaca, NY
Various positions:

- *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 of Record — Blacksburg, VA
ME 3414 Fluid Dynamics at Virginia Tech — Spring 2022

- Fully responsible for class of 42 students at junior/senior level
- Developed lectures, homework assignments, quizzes, and exams

Instructor — Davidson, NC
Engineering Problem Solving at *Duke Talent Identification Program* — Summer 2018 & 2019

- Taught 15-16 students in an immersive summer program with 100+ contact hours
- Wrote syllabus, developed lesson plans, and taught a class of gifted middle school students
- Provided feedback to students & parents at end-of-term meeting

Graduate Teaching Assistant at Virginia Tech:

- *Computational Methods* at Sophomore level — Spring 2018
- *Introduction to Fluid Mechanics* at Junior level — Fall 2018 & Fall 2022
- *Dynamics* at Sophomore level — Spring 2019
- *Introduction to Solid Mechanics* at Graduate level — Spring 2019
- *Continuum Mechanics* at Graduate level — Fall 2022

Teaching Assistant at Cornell University:

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

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, Graduate Student Association Travel Fund Program — Spring 2018
- Judge for Blue Ridge Highlands Regional Science Fair — Spring 2020
- Reviewer, Graduate Research Development Program, Virginia Tech — Fall 2022