

Ilan M. L. Upfal

Department of Civil and Environmental Engineering, MIT

iupfal@mit.edu • 401-241-4368

Education

Massachusetts Institute of Technology

September 2023 – Present

Ph.D. Candidate, Civil and Environmental Engineering

Brown University

September 2018 – December 2022

Electrical Engineering, Sc.B. with Honors

Publications

- **I. M. L. Upfal**, K. J. McClure, K. S. Heck, S. Pieris, J. W. Kurelek, M. Hultmark, and M. F. Howland (2026) “An analytical model for rotors in confined flow across operating regimes” *J. Fluid Mech.* **1045**, A3.
- J. W. Kurelek, **I. M. L. Upfal**, S. Pieris, K. S. Heck, A. Piqué, M. Hultmark, and M. F. Howland. (2026) “Full dynamic similarity experiments and predictive modeling of wind turbine aerodynamics across control strategies” *PNAS Nexus* **5**(10), pgag303.
- K. S. Heck, J. Liew, **I. M. L. Upfal**, and M. F. Howland. “Joint Yaw-Induction Control Optimization for Wind Farms” *Wind Energy Science* (2025) *In review*.
- **I. M. L. Upfal**, Y. Zhu, E. Handy-Cardenas, and K. Breuer. “Shape-morphing membranes augment the performance of oscillating foil energy harvesting turbines” *Physical Review Fluids* **10**(3), 034702 (2025) *Selected as Editor’s Suggestion*.

Honors and Awards

- **Best Poster Award (Runner up)**, EUROMECH Recent Advances in Turbulent Wind Farm Dynamics Colloquium April 2026
- **TVML Fellowship**, MIT September 2025 – May 2026
- **Best Poster Award**, MIT CEE Research Day Symposium February 2025
- **Editor’s Suggestion**, *Physical Review Fluids* January 2025
- **MathWorks Fellowship**, MIT September 2024 – May 2025
- **Exemplary Mentoring Fellowship**, MIT September 2023 – Present
- **Robert E. Thurber and Louis Berger Fellowship**, MIT September 2023 – May 2024
- **Halpin Prize for Senior Capstone Projects**, Brown University May 2022
- **Sigma Xi Honors Society**, Brown University May 2022
- **Tau Beta Pi Engineering Honors Society**, Brown University December 2021

Research Experience

Research Assistant

Howland Lab, Civil and Environmental Engineering, MIT

August 2023 – Present

SULI Research Intern

Building Technologies and Science Center, NREL

January – May 2023

Undergraduate Research Assistant

Breuer Lab, Brown University

March 2021 – December 2022

Teaching and Mentoring

- MIT Summer Research Program Mentor June 2026 – August 2026
- Undergraduate Research Opportunity Mentor January 2026 – May 2026
- MIT Summer Research Program Co-mentor June 2025 – August 2025

Conference Presentations

- **I. M. L. Upfal**, J. W. Kurelek, S. Pieris, K. S. Heck, M. Hultmark, and M. F. Howland. “A new joint yaw and induction control paradigm revealed by Unified rotor modeling and validation” *EUROMECH Recent Advances in Turbulent Wind Farm Dynamics Colloquium*, 2026. **Best Poster Award (Runner up)**
- **I. M. L. Upfal**, K. J. McClure, K. S. Heck, S. Pieris, J. W. Kurelek, M. Hultmark, and M. F. Howland. “An Analytical Model for Rotors in Confined Flow Across Operating Regimes” *CEE Research Day Symposium*, 2026.
- **I. M. L. Upfal**, K. J. McClure, K. S. Heck, S. Pieris, J. W. Kurelek, M. Hultmark, and M. F. Howland. “An analytical model for rotors in confined flow across operating regimes” *NAWEA/WindTech*, 2026.
- **I. M. L. Upfal**, J. W. Kurelek, S. Pieris, K. S. Heck, J. Liew, M. Hultmark, M. F. Howland. “Unified rotor modeling: experimental validation at full dynamic similarity and implications for turbine design and flow control” *American Physical Society: Division of Fluid Dynamics Meeting*, 2025.
- **I. M. L. Upfal**, J. W. Kurelek, S. Pieris, K. S. Heck, J. Liew, M. Hultmark, M. F. Howland. “Experimental validation of a Unified rotor model with full dynamic similarity wind tunnel experiments” *NAWEA / WindTech*, 2025.
- **I. M. L. Upfal** and M. F. Howland. “Co-optimization of wind farm layout with collective turbine control”, *CEE Research Day Symposium*, 2025. **Best Poster Award**
- **I. M. L. Upfal** and M. F. Howland. “Control co-design of wind farms using joint yaw-induction control”, *American Physical Society: Division of Fluid Dynamics Meeting*, 2024.
- **I. M. L. Upfal** and M. F. Howland. “Co-optimizing layout and joint yaw-thrust control to design cost-effective and profitable wind farms”. *North American Wind Energy Association (NAWEA/WindTech) Conference*, 2024.
- **I. M. L. Upfal** and M. F. Howland. “Improving wind farm profitability and space efficiency by co-designing turbine layout and control”. *MIT CEE Research Day Symposium*, 2024.

- **I. M. L. Upfal**, Y. Zhu, E. Handy-Cardenas, J. Newbolt, and K. Breuer. “Compliant membranes to augment oscillating foil energy harvesting”. *American Physical Society: Division of Fluid Dynamics Meeting*, 2022.
- **I. M. L. Upfal**, Y. Zhu, and K. Breuer. “Optimal energy harvesting kinematics for compliant membrane hydrofoils”. *American Physical Society: Division of Fluid Dynamics Meeting*, 2021.

Service

CEE Graduate Application Advisor

CEE Graduate Assistance Program, MIT

September – December 2024