Emily Williams

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EDUCATION

Massachusetts Institute of Technology (MIT) Sep 2021 – June 2026
MS/PhD in Aeronautics and Astronautics GPA: 5.00 / 5.00
Specialization in Computational Science and Engineering
Advisor: Adrian Lozano-Durán (Computational Turbulence Group)
Funding: Department of Energy Computational Science Graduate Fellowship
Research Interests: *hypersonics, turbulence, computational fluid dynamics, aerothermodynamics, national security, national intelligence, information theory, numerical methods, quantum computation, artificial intelligence, machine learning, data visualization, high-performance computing, design automation*

University of Illinois at Urbana-Champaign (UIUC) Aug 2017 – May 2021
BS with Highest Honors in Aerospace Engineering GPA: 3.94 / 4.00
Minor in Atmospheric Sciences
Concentration in Computational Science and Engineering

CURRENT RESEARCH PROJECTS

Neural Network Subgrid-Scale Model for Incompressible Homogeneous Isotropic Turbulence

- Employing machine learning techniques in the subgrid-scale modeling for wall-modeled large-eddy simulation of incompressible homogeneous isotropic turbulence
- Presenting at Stanford University Center for Turbulence Research Summer Program in August 2022 in Palo Alto, CA

Information-Theoretic Approach for Subgrid-Scale Modeling for Compressible Wall Turbulence

- Assessing performance of information-preserving subgrid-scale model formulated using the Kullback-Leibler divergence for wall-modeled large-eddy simulation of compressible turbulent channel flow
- New model matches or exceeds the accuracy of existing models when compared to direct numerical simulation data for the compressible channel in the prediction of statistical quantities of interest
- Presented and published at AIAA Aviation Forum in June 2022 in Chicago, IL

Error Scaling of Wall-Modeled Large-Eddy Simulation of Compressible Wall Turbulence

- Characterizing error scaling properties of wall-modeled large-eddy simulation of compressible wall-bounded turbulent flows for different grid resolutions, Mach numbers, and Reynolds numbers in the prediction of statistical quantities of interest such as mean velocity, wall stress, skin friction, and heat transfer
- Extrapolating results to full-size external aerodynamic applications, such as the Lockheed Martin X-59 QueSST and Boeing X-51 Waverider
- Presented at American Physical Society Division of Fluid Dynamics Annual Meeting in November 2021 in Phoenix, AZ

POSTERS, PRESENTATIONS, & PUBLICATIONS

Lozano-Durán, A., **Williams, E.**, Ling, Y., Arranz, G., "Wall-modeled LES based on information-preserving principles and building-block flows," Stanford University Center for Turbulence Research 2022 Summer Program, August 2022.

Williams, E., Lozano-Durán, A., "Information-Theoretic Approach for Subgrid-Scale Modeling for High-Speed Compressible Wall Turbulence," AIAA Aviation Forum, June 2022.

Williams, E., Lozano-Durán, A., "Error Scaling of Wall-Modeled Large-Eddy Simulation of Compressible Wall Turbulence," American Physical Society Division of Fluid Dynamics, November 2021.

Williams, E., Ling, Y., Arranz, G., and Lozano-Durán, A., "Numerical Schlieren of the X-59 QueSST," American Physical Society Division of Fluid Dynamics Gallery of Fluid Motion, November 2021.

Ling, Y., **Williams, E.**, Arranz, G., and Lozano-Durán, A., "Can the X-Wing Survive the Reentry to Dagobah?" American Physical Society Division of Fluid Dynamics Gallery of Fluid Motion, November 2021.

Williams, E., Sharma, M.P., Venturi, S., and Panesi, M., "Relation of Dissociation Rates to the Centrifugal Barrier," University of Illinois Undergraduate Research Symposium, April 2020.