Declan Gaylo

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About Me

I am a Ph.D. candidate at MIT studying Hydrodynamics. My research is on turbulent bubbly flow, with an interest in modeling ship wakes. Through my research, education, and experience, I have demonstrated skill in

- Fundamental hydrodynamics research
- Naval architecture, including high-speed vessels
- Development of novel computational methods
- Teaching and communicating hydrodynamics

Education

Ph.D., Hydrodynamics **Pursuing**
Massachusetts Institute of Technology – Cambridge, MA
Thesis: *Evolution of Turbulent Bubbly Flow Beneath an Entraining Free Surface* (tentative)

S.M., Naval Architecture & Marine Engineering **2021**
Massachusetts Institute of Technology – Cambridge, MA
Thesis: *Effects of Power-Law Entrainment on Bubble Fragmentation Cascades*

B.S., Naval Architecture & Marine Engineering **2019**
Webb Institute – Glen Cove, NY
Thesis: *Pressure Effects of Transom Lift Devices on Prismatic Planing Hulls*

Experience

Research Assistant Massachusetts Institute of Technology – Cambridge, MA **2019 – Present**
Through an ONR funded project, developed fundamental understanding of air entrainment in ship wakes as well as new computational tools to study these bubbly flows. This included development of a parallelized CFD program to run on large HPC clusters. Additional responsibilities included system administration and maintenance of a small cluster used by my lab.

Teaching Assistant Massachusetts Institute of Technology – Cambridge, MA **2019 – Present**
Assisted with graduate courses: Marine Hydrodynamics, Design Principles for Ocean Vehicles, and Stochastic Systems. Responsible for recitations, office hours, homework creation and grading, and exam creation and grading.

Student Intern Navatek, Ltd. – Portland, ME **Winter, 2019**
Worked on 3D-modeling of advanced hull concepts and created a graphical user interface to provide basic stability criteria of trimaran for exploring design spaces.

Student Intern Donald L. Blount and Associates – Chesapeake, VA **Summer, 2018**
Analyzed dynamic and static stability and interpreted model test data for military and recreational high-speed craft.

Selected Publications

For a complete list, see dgaylo.com/home/publications

Journal Papers

– Gaylo, Hendrickson, and Yue (2023). Fundamental time scales of bubble fragmentation in homogeneous isotropic turbulence. *Journal of Fluid Mechanics*.
– Gaylo, Hendrickson, and Yue (2022). An Eulerian label advection method for conservative volume-based tracking of bubbles/droplets. *Journal of Computational Physics*.

Conference Presentations

– Gaylo, Hendrickson, and Yue (2022). *Quantifying Fragmentation Statistics in Two-Phase Turbulent Flows for Ship Wake Applications.* 34th Symposium on Naval Hydrodynamics, Washington, D.C..

Skills

- Hydrodynamics
- Two-phase fluid simulations
- Linux system administration
- High-Performance Computing
- C++ and FORTRAN (with MPI)
- MATLAB, Git, and Bash
- Naval Architecture
- GHS, XFOIL, and OpenProp
- AutoCAD, Rhino, and SolidWorks