

Johnathon Barbish

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Education

Ph.D. in Mechanical Engineering

VIRGINIA TECH

- The Effect of Tension and Nonlinearity on the Dynamics of Small Elastic Systems in Fluid
- Future Professoriate Graduate Certificate

Blacksburg, Virginia

Aug. 2018 - Exp Aug. 2023

B.S. in Mechanical Engineering

B.S. in Physics

VIRGINIA TECH

- Honor Scholar

Blacksburg, Virginia

Aug. 2014 - May 2018

Research Experiences

Graduate Research Assistant

DEPARTMENT OF MECHANICAL ENGINEERING

- Developed theoretical models of the dynamics of nanoscale devices due to thermal and driven dynamics
- Characterized the role of tension in the dynamics of a doubly clamped nanobeam immersed in fluid
- Connecting discrete and continuous models of stochastically driven systems using numerical methods
- Investigating the statistical properties of nanoscale systems driven by fluctuations into the nonlinear regime

Virginia Tech, Blacksburg, VA

Fall 2018 - Present

Summer Research Intern

LOS ALAMOS NATIONAL LABORATORY

- Developed parallel algorithms for estimating macroalgae growth across ocean models
- Learned computational modelling techniques for shock-hydro code applications

Los Alamos, NM

Summer 2018

Undergraduate Research Assistant

DEPARTMENT OF MECHANICAL ENGINEERING

- Analyzed chaotic behavior of coupled map lattice systems with covariant Lyapunov vectors
- Characterized the statistical properties of coupled map lattices.

Virginia Tech, Blacksburg, VA

Fall 2016 - Spring 2018

Undergraduate Research Assistant

VIRGINIA BIOINFORMATICS INSTITUTE

- Connected and characterized the publication practices of scientists suspected of duplicate grant funding
- Searched for additional grants by the scientists suspected of grant fraud

Virginia Tech, Blacksburg, VA

November 2014 - December 2015

Publications

H. Gress, J. Barbish, C. Yanik, I. I. Kaya, R. T. Erdogan, M. S. Hanay, M. González, O. Svitelskiy, M. R. Paul, and K. L. Ekinici, "Multi-mode Brownian Dynamics of a Nanomechanical Resonator in a Viscous Fluid," *Submitted*, Mar. 2023.

J. Barbish, and M. R. Paul, "Using Covariant Lyapunov Vectors to Quantify High Dimensional Chaos with a Conservation Law," *Submitted*, Mar. 2023, Preprint ArXiv, doi: 10.48550/ARXIV.2303.13977.

J. Barbish, C. Ti, K. L. Ekinici, and M. R. Paul, "The dynamics of an externally driven nanoscale beam that is under high tension and immersed in a viscous fluid," *Journal of Applied Physics*, vol. 132, no. 3, p. 034501, Jul. 2022, doi: 10.1063/5.0100462.

Presentations

J. Barbish*, H. Gress, K. Ekinici, and M. R. Paul, "How Shrinking a Beam to the Nanoscale Yields Nonlinear Dynamics when Driven by Brownian Motion," presented at the Walter O'Brien Research Symposium, Apr. 2023.

J. Barbish*, H. Gress, K. Ekinici, and M. R. Paul, "Exploring the Role of Nonlinearity in the Brownian Driven Motion of Micro and Nanoscale Elastic Objects in Fluid," presented at the SIAM Southeastern Atlantic Section Meeting, Mar. 2023.

J. Barbish*, H. Gress, K. Ekinici, and M. R. Paul, "The Fluctuations of Small Elastic Objects in Fluid with Linear and Non-linear Restoring Forces," presented at the APS March Meeting, Mar. 2023.

J. Barbish*, C. Ti, K. Ekinici, and M. R. Paul, "Multimodal Analysis of Driven Nanobeams with Arbitrary Tension in a Viscous Fluid," presented at the APS DFD, Nov. 2022.

H. Gress, J. Barbish, M. R. Paul, and K. Ekinici, "Brownian Fluctuations of a Nanomechanical String Resonator Immersed in a Viscous Fluid," presented at the APS DFD, Nov. 2022.

C. Taylor, J. Barbish, and M. R. Paul, "Molecular Fluctuations of Nanoscale Objects Immersed in Fluid," presented at the Mechanical Engineering Undergraduate Research Showcase, Virginia Tech, Sep. 2022.

J. Barbish* and M. R. Paul, "Spatially Varying Force on a Doubly Clamped Beam in Tension Immersed in Fluid," presented at the Walter O'Brien Research Symposium, Apr. 2022.

J. Barbish* and M. R. Paul, "Quantifying High Dimensional Chaos with Covariant Lyapunov Vectors," presented at the Fall Fluids Symposium, Oct. 2018.

J. Barbish*, M. Xu, and M. R. Paul, "Probing the Chaotic Dynamics of Fluids using Insights from Coupled Map Lattices," presented at the APS DFD, Nov. 2017.

M. R. Paul, M. Xu, J. Barbish, and S. Mukherjee, "Using Covariant Lyapunov Vectors to Understand Spatiotemporal Chaos in Fluids," presented at the APS DFD, Nov. 2017.

* denotes presentations given by me.

Teaching Experiences

Graduate Student Instructor (ME 3124)

DEPARTMENT OF MECHANICAL ENGINEERING

- Teaching an average class size of 50 students on classical thermodynamics (a junior level course)
- Writing course lectures, homework, and exams to enhance student understanding
- Rapidly adapted class structure from traditional to online setting during Coronavirus outbreak

Virginia Tech, Blacksburg, VA

Fall 2019 & Spring 2020

Graduate Teaching Assistant for Fluid Mechanics

DEPARTMENT OF MECHANICAL ENGINEERING

- Generated grading rubric and graded weekly homework assignments for 140 students
- Answered student questions to improve their understanding of fluid mechanics during weekly office hours

Virginia Tech, Blacksburg, VA

Fall 2018

Work Experiences

Operations Research Analyst Intern

MITRE ORGANIZATION

- Analyzed complex systems with multifractal dynamical systems and statistical perspectives
- Crafted visualizations of multiple properties of large-scale network dynamics
- Aided in the development and use of numerical optimization model and algorithm for agile acquisition
- Compiled, documented, and utilized in-house codes for analyzing operational networks

McLean, VA

Summer 2019, 2020

Summer Internship: Engineering Trainee

NAVFAC MIDLANT

- Assisted in developing preventative maintenance schedules for new or existing equipment
- Developed an Access database to store information about fire protection systems

Norfolk Naval Base, Norfolk, VA

Summer 2016

Summer Internship: Office Automation Clerk

NAVY CRANE CENTER

- Debugged webpage-based training courses
- Performed data analysis on project data to rate performance

Norfolk Naval Shipyard,
Portsmouth, VA

Summer 2015

Extracurricular Activities

Director of Finance

GRADUATE AND PROFESSIONAL STUDENT SENATE

- Developed policies and appropriations strategies for \$1.7 million to student organizations
- Managed \$91,000 of funding for 100+ graduate student organizations
- Chaired bi-weekly meetings, hearing over 200 funding requests

Virginia Tech, Blacksburg, VA

Oct 2022 - May 2023

Founding President

GRADUATE ENGINEERING ALLIANCE (GEA)

- Founded GEA to build community amongst all engineering graduate students
- Organized student leaders across 8+ departments
- Developed action plans for analyzing the operations of student organizations

Virginia Tech, Blacksburg, VA

Aug 2022 - May 2023

President

MECHANICAL ENGINEERING GRADUATE STUDENT COUNCIL (MEGSC)

- Founded peer mentoring program for incoming grad students
- Used \$4000 budget to maximize community building amongst 300 ME grad students
- Organized outreach and technical events for prospective and current grad students

Virginia Tech, Blacksburg, VA

Feb 2020 - May 2022

Associate

GRADUATE ACADEMY FOR TEACHING EXCELLENCE

- Cross-disciplinary graduate students dedicated to improving our teaching abilities

Virginia Tech, Blacksburg, VA

Oct 2019 - Present

Wheel Part Holder

FORMULA SAE

- Refined the manufacturing procedure of carbon fiber wheels for formula style race car
- Developed classical laminate models of composite undergoing various loading cases

Virginia Tech, Blacksburg, VA

Sept 2016 - May 2018

Honors & Awards

- 2023 **Group on Statistical and Nonlinear Physics (GSNP) Student Speaker Finalist**, APS March Meeting
- 2022 **Pratt Fellowship**, Virginia Tech
- 2014-2018 **Dean's List: 8 semesters**, Virginia Tech
- 2016 **Tau Beta Pi (Engineering Honor Society)**, Virginia Tech
- 2016 **Sigma Pi Sigma (Physics Honor Society)**, Virginia Tech
- 2016 **Robert C. Richardson Memorial Scholarship**, Virginia Tech
- 2016 **Harry B. Gilbert Merit Scholarship**, Virginia Tech
- 2016 **Bayport Beard/Bennett Memorial Scholarship**, Virginia Tech
- 2012 **Eagle Scout**, Boy Scouts of America

Las Vegas, NV
Blacksburg, VA
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Blacksburg, VA
Blacksburg, VA
Blacksburg, VA
Blacksburg, VA
Blacksburg, VA
Chesapeake, VA

Skills

- Programming** Julia, MATLAB, Python, LaTeX, Git, JAVA, Django, HTML, C++
- CAD/CAE** COMSOL, NX for part modeling, assembly, and manufacturing, Inventor
- Manufacturing** Manual and CNC Mill and Lathe, Carbon fiber layups, curing, and post-processing