Johnathon **Barbish**

Visiting Assistant Professor

barbisjr@jmu.edu | johnbarbish.github.io | JohnBarbish | john-barbish

Education

Ph.D. in Mechanical Engineering

Blacksburg, Virginia

Virginia Tech

Aug. 2018 - Aug. 2023

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

B.S. in Mechanical Engineering
B.S. in Physics

Blacksburg, Virginia

Virginia Tech

Aug. 2014 - May 2018

- Honor Scholar

Teaching Experiences

Visiting Assistant Professor

James Madison University, Harrisonburg, VA

Department of Engineering

Fall 2024 - Spring 2025

- Co-instructing with experienced faculty in lecture and lab settings
- Assisting with Engineering Design 1 (sophomore), Materials and Advanced Mechanics (junior), and Systems Analysis (senior)

Assistant Professor (Adjunct)

Virginia Western Community College, Roanoke, VA

Department of Engineering

Summer 2024

- Developed rubrics and evaluated student comprehension of mechanics of materials (deforms) through online exams
- Answered student questions in statics, dynamics, and deforms to improve their understanding during virtual office hours
- Assisted with proctoring online exams with 100+ students

Instructor (ME 2134)

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Fall 2023 - Spring 2024

- Teaching multiple classes of 60+ sophomore students on classical thermodynamics
- Writing course lectures, homework, and exams to enhance student understanding
- Developing an ill-structured project to help students bring thermodynamics into their everyday lives

Graduate Student Instructor (ME 3124)

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Fall 2019 & Spring 2020

- Teaching an average class size of 50 students on classical thermodynamics (a junior level course)
- Rapidly adapted class structure from traditional to online setting during Coronavirus outbreak

Graduate Teaching Assistant for Fluid Mechanics

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Fall 2018

- 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

Research Experiences

Postdoctoral Researcher

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Aug. 2023 - Jul. 2024

- Developed finite element simulations to simulate the deterministic ring down of nanoscale devices
- Investigating the frequency dependent statistical properties of nanoscale systems driven by fluctuations

Graduate Research Assistant

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Aug. 2018 - Aug. 2023

- 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

Summer Research Intern

Los Alamos, NM

Los Alamos National Laboratory

Summer 2018

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

Undergraduate Research Assistant

Virginia Tech, Blacksburg, VA

Department of Mechanical Engineering

Nov. 2016 - May 2018

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

Service Experiences

Director of Finance

Virginia Tech, Blacksburg, VA

Graduate and Professional Student Senate

Oct. 2022 - May 2023

- 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

Founding President

Virginia Tech, Blacksburg, VA

Graduate Engineering Alliance (GEA)

Aug. 2022 - May 2023

- 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

President

Virginia Tech, Blacksburg, VA

Mechanical Engineering Graduate Student Council (MEGSC)

Feb. 2020 - May 2022

- 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

Associate

Virginia Tech, Blacksburg, VA

Graduate Academy for Teaching Excellence

Oct. 2019 - May 2023

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

Publications

J. Barbish, and M. R. Paul, "Using Covariant Lyapunov Vectors to Quantify High Dimensional Chaos with a Conservation Law," *Phys. Rev. E*, vol. 108, no. 5, p. 054202, Nov. 2023. doi: 10.1103/PhysRevE.108.054202

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. Ekinci, "Multi-mode Brownian Dynamics of a Nanomechanical Resonator in a Viscous Fluid," *Phys. Rev. Appl.*, vol. 20, no. 4, p. 044061, Oct. 2023. doi: 10.1103/PhysRevApplied.20.044061

J. Barbish, C. Ti, K. L. Ekinci, 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

H. Gress, J. Barbish, M. R. Paul, and K. Ekinci, "Thermal Fluctuations of a Nanomechanical Beam Resonator in a Viscous Fluid," presented at the Frontiers of Nanomechanical Systems, Jun. 2023.

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

J. Barbish*, C. Ti, K. Ekinci, 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. Ekinci, "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.

Honors & Awards

2023-2024	**Dean's List for Teaching Performance**, Virginia Tech	*Blacksburg, VA*
2023	**Group on Statistical and Nonlinear Physics (GSNP) Student Speaker Finalist**, APS March Meeting	*Las Vegas, NV*
2022	**Pratt Fellowship**, Virginia Tech	*Blacksburg, VA*
2014-2018	**Dean's List: 8 semesters**, Virginia Tech	*Blacksburg, VA*
2016	**Tau Beta Pi (Engineering Honor Society)**, Virginia Tech	*Blacksburg, VA*
2016	**Sigma Pi Sigma (Physics Honor Society)**, Virginia Tech	*Blacksburg, VA*
2012	**Eagle Scout**, Boy Scouts of America	*Chesapeake, VA*

Skills

Programming	MATLAB, Python, Julia, 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, basics of welding