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Summary

I am a fifth year doctoral candidate in the Department of Mathematics and Statistics at Florida Atlantic University studying computational dynamical systems, differential equations, and nonlinear analysis. In particular, I employ functional-analytic techniques and computer-assisted proofs to rigorously study chaotic systems of ordinary differential equations, state-dependent delay differential equations, and travelling wave solutions of partial differential equations. I am also creating novel software to automate the computation and validation of invariant manifolds in ODE systems, and am applying this in my thesis as a new approach to classify the stability of traveling waves. In general, I view the computer as an invaluable tool in mathematics research and I enjoy learning and developing computational techniques to study open problems in mathematics.

Education

Doctor of Philosophy, Mathematics — *Spring 2025 (Expected)*

Florida Atlantic University

- Dissertation: *Existence and stability of nonlinear waves: a computer-assisted approach.*
- 3.98/4.00 GPA

Master of Science, Mathematics — *2020*

Florida Atlantic University

- MS Presentation: *The Stable Manifold Theorem*
- 4.00/4.00 GPA

Bachelor of Science, Mathematics — *2018*

Florida Atlantic University

- Minor in Statistics
- 3.84/4.00 GPA

Professional Experience

Graduate Teaching Assistant — *2018-Current*

Florida Atlantic University

- Duties include tutoring, grading, and teaching for undergraduate courses in mathematics and statistics.

Graduate Research Assistant — *2020-2021, 2022-2024*

Florida Atlantic University

- Partially supported to perform data analysis on an NSF-funded project in collaboration with FAU's College of Education.

NSF Mathematical Sciences Graduate Research Intern — *2023*

U.S. Army Corps of Engineers' Research and Development Center

- Intensive summer-long applied mathematics research program, funded by the NSF and administered by the Oak Ridge Institue for Science and Education (ORISE). The appointment took place onsite in Vicksburg, Mississippi.
- Performed research concerning the development of cryptanalytic tools to make predictions in chaotic systems. This work culminated in a paper and has been submitted to *Physical Review E* (see Publications [1]).

Teaching Experience

As Course Instructor

- MAP 3305 Engineering Mathematics 1 (Fall 2024, Fall 2022, Spring 2022)
- MAS 2103 Matrix Theory (Spring 2024)
- MAC 2312 Calculus with Analytic Geometry 2 (Fall 2023, Spring 2023)
- MAC 1105 College Algebra (Fall 2021)
- STA 2023 Introductory Statistics (Spring 2020)
- MAC 2233B Methods of Calculus (Fall 2019)

As Teaching Assistant/Embedded Tutor

- MAS 2103 Matrix Theory (Summer 2024)
- MAD 3400 Numerical Methods (Fall 2023)
- MAD 2104 Discrete Mathematics (Summer 2022)
- STA 3100 Computational Statistics (Spring 2021)

Publications

[1] **"Predicting State Switches in Chaotic Dynamical Systems"** *Submitted July 2024*
with K. Pilkiewicz and M. Mayo

[2] **"Periodic orbits for state-dependent delay differential equations"** *Submitted April 2024*
with V. Naudot

[3] **"Existence and Stability of Travelling Waves: A Computer-Assisted Approach"** *In preparation*
with J. D. Mireles-James

[4] **"Periodic Orbits in the State-Dependent Van der Pol System"** *In preparation*
with V. Naudot

[5] **"Recruitment and Retention of STEM Teachers in High Need Schools: an Alumni Survey Analysis of Selected NSF Robert Noyce Programs"** *In preparation*
with D. Kumar and S. Moffitt

[6] **"A Mixed Method Study of STEM Teacher Supply to High Need Schools in Florida and Texas"** *In preparation*
with D. Kumar, S. Moffitt, and C. Restrepo-Widney

Posters, Presentations, & Lectures

Periodic Orbits for State-Dependent Delay Differential Equations

Paper presented at:

- 2024 Florida Women in Math Day, Florida Atlantic University, Boca Raton, FL. *April 21, 2024*
- *Special Session on Recent Developments in Nonlinear and Computational Dynamics,* *April 7, 2024*
  Spring 2024 AMS Eastern Sectional Meeting, Howard University, Washington, D.C.
- Graduate Student Seminar, Florida Atlantic University, Boca Raton, FL. *March 29, 2024*

Predicting State Switches in Chaotic Dynamical Systems

Paper presented at:

- 13th Annual FAU Broward Research Symposium, Florida Atlantic University, Davie, FL. *November 17, 2023*
  (Poster Session)
- Graduate Student Seminar, Florida Atlantic University, Boca Raton, FL. *November 2, 2023*
- Analysis & Applications Seminar, Florida Atlantic University, Boca Raton, FL. *October 19, 2023*
- 2023 NSF MSGI Summer Research Symposium (*Virtual Event*) *August 22, 2023*
- Environmental Processes Branch Seminar, USACE ERDC, Vicksburg, MS. *August 10, 2023*

The Stable Manifold Theorem

- M.S. Presentation, Florida Atlantic University *April 17, 2020*

The Dynamics of Circle Maps and Denjoy's Theorem

- Multi-class lecture for graduate course in Dynamical Systems at Florida Atlantic University *February 2020*

The Fourier Transform, Regularity, and Sobolev Embedding

- Lecture for graduate course in Partial Differential Equations at Florida Atlantic University *November 2019*

Programming Experience

Languages: MATLAB | R | Python | LaTeX

Relevant Skills INTLAB | R Markdown | ggplots2 | SageMath

Fellowships & Scholarships

Isaac Schur Graduate Scholarship *2021*
- Awarded to graduate students in mathematics who have successfully passed two qualifying exams, maintained a high GPA in graduate studies, and received distinguished letters of recommendation from two professors
- Award of $1,000

FAU Presidential Fellowship *2018-2020*
- Two-year fellowship awarded to doctoral students who have exhibited an excellent academic record and excellent letters of recommendation as determined by faculty at the time of admission
- Award of $5,000 per year for the first two years of graduate studies

Florida Bright Futures Scholarship *2018-2019*
- Undergraduate scholarship awarded to Florida public university attendees with distinguished GPAs and SAT scores

Activities & Services

Graduate Student Seminar, Organizer *2022-Current*
- Organized and co-hosted weekly seminars, with presentations by graduate students and faculty within FAU's Department of Mathematical Sciences

AMS Student Chapter

President *2023-Current*
- Organized and lead chapter meetings, aided in organizing chapter events, and recruited officers and members for AMS student chapter.

Treasurer *2022-2023*
- Managed funds and purchases for AMS-related events and activities at Florida Atlantic University.

Florida Atlantic Jazz Orchestra, Lead Trombone *2016-2017, 2024*
- Attended biweekly rehearsals and performed at various venues for concerts and events as the first-chair trombone player.

Technology Fee Committee, Graduate Student Representative *2021 - 2022*
- Served on committee formed to review proposals and allocate funds for various technology-related enhancements across FAU.

Certificates & Honors

- ACS Disaster Response Certificate (2024)
- CITI Responsible Conduct of Research Certificate (2023)
- CITI Social & Behavioral Research Investigators Certificate (2022)
- CRLA Level 3 Certified Tutor (2018)
- FAU Honors Program (2015-2018)