Alex David Rodriguez

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Education

Florida International University, PhD in Applied Mathematics — Aug 2020 – Present

- Thesis: *The Nonlinear Schrödinger Equation with combined noninearities.*
- Advisor: Dr. Svetlana Roudenko.
- Anticipated Graduation Summer 2026.

Florida International University, M.S. in Mathematical Sciences — Aug 2020 – May 2022

Florida International University, B.S. in Mathematical Sciences — Aug 2018 – Aug 2020

- GPA: 3.9/4.0.

Awards and Honors

Honorable Mention – NSF Graduate Research Fellowship Program — 2021

FIU Student Life Awards — 2022, 2021

Undergraduate Award – FIU Outstanding Academic Achievement award — 2021

Publications

1. A. Millet, **A.D. Rodriguez**, S. Roudenko, and K. Yang. Behavior of solutions to the 1D focusing stochastic nonlinear Schrödinger equation with spatially correlated noise. *Stochastics and Partial Differential Equations: Analysis and Computations*, 2021

2. O. Riaño, **A.D. Rodriguez**, and S. Roudenko. Nonlinear Schrödinger equation with combined nonlinearities. *Preprint*

3. **A.D. Rodriguez**, G. Azcoitia, and H. Wubben. Review of well-posedness methods for the 1D nonlinear Schrödinger equation with an application to combined nonlinearities. *Preprint*

4. **A.D. Rodriguez**. Blow up criteria for the NLS with many nonlinear terms. *Preprint*

Projects

Screening and Designing New Metal/alloy Carriers for Efficient H2 Storage. — Jun 2025 - Present

- Internship at National Energy Technoloy Lab (NETL), Pittsburgh, PA.
- My tasks included data processing and collection from the calculations and using first principles techniques to study the material Magnesium Borohydride. I employed my problem solving and programming skills to write scripts to streamline the data collection and visualization. We aim to transition to a machine learning approach to study other materials suitable for hydrogen storage.

Experience

Research Assistant, FIU – Miami, FL Aug 2020 – Present

- Primary research area in dispersive partial differential equations, specifically the nonlinear Schrödinger equation. Studies done both analytically and numerically.
- Numerical study conducted primarily in MATLAB using numerical methods such as IRK4, Fourier spectral method, and finite difference method. The goal was to use these mathematical modeling techniques to study global behavior of solutions to specific partial differential equations.

Intern, NNSA MSIIP / NETL – Pittsburgh, PA and Remote Jun 2025 - Present

- Intern through the NNSA minority serving institution internship program (MSIIP), conducted materials science research for efficient storage of Hydrogen.
- Utilize JOULE HPC to conduct DFT calculations and write python and bash scripts to streamline workflow.
- Mentors: Dr. Yuhua Duan and Dr. Yueh-lin Lee

Graduate Mentor, FIU – Miami, FL Jun - Aug 2021, '22, '23

- Mentored undergraduate students during a summer research program, involved leading research projects and lecturing students. The first 2-3 weeks of the program involved lecturing and preparing students for mathematics research. The following 5-6 weeks involved research into assigned topics; in my case, I lead a group on partial differential equations.

Teaching Assistant, FIU – Miami, FL Aug 2020 – Present

- Assisted in teaching and grading for the following undergraduate and graduate courses: calculus 1 - 3, differential equations, advanced calculus, stochastic differential equations, and complex analysis.
- Assisted in designing a fully online calculus course.
- Primary instructor for Calculus 1 during Fall 2024 and Spring 2025.

Presentations

Talks

1. On the NLS with combined nonlinear terms, well-posedness and blow-up results. SIAM Advances in Dispersive PDE, Pittsburgh, PA, Nov 2025
2. On the NLS with combined nonlinear terms. First Workshop in PDE, University of Mayaguez, Puerto Rico, Oct 2025
3. Well-posedness, scattering and blow up for the NLS with combined nonlinear terms. AMS Special Session on Nonlinear Dispersive Equations, Unversity of Kansas, Mar 2025
4. Nonlinear Schrödinger equation with combined nonlinearities. AMS Special Session on Nonlinear Hamiltonian PDEs, Howard University, Apr 2024
5. Nonlinear Schrödinger equation with infinitely many nonlinear terms. JMM, Jan 2024
6. On the nonlinear Schrödinger equation with combined nonlinearities. FIU Applied Math Seminar, Feb 2022

7. Nonlinear Schrödinger equation with combined nonlinearities in 1D. JMM, Jan 2022
8. On the 1D focusing stochastic NLS equation with spatially correlated noise. FIU Joint Applied Math and Stats Seminar, Nov 2021
9. Solutions to the 1D focusing stochastic NLS equation with spatially correlated noise. AMS Special Session on Calculus of Variation, Nonlinear Waves and their Numerical Realizations, Virtual, Nov 2021

Posters

1. Nonlinear Schrödinger equation with infinitely many nonlinear terms. 1st Colombia WNDE, Nov 2023
2. Nonlinear Schrödinger equation with infinitely many nonlinear terms. Joint Alabama-Florida Conference on Differential Equations, Dynamical Systems and Applications, May 2023
3. Nonlinear Schrödinger equation with infinitely many nonlinear terms in 1d. 5th WNDE, UFMG in Belo Horizonte, Nov 2022
4. Balance of opposing potentials with infinite terms in the Schrödinger equation. Graduate Scholarly forum @ FIU, Apr 2022

Service

1. Graduate student representative for Math Department. Feb 2024 - Present
2. President of Students in Graduate Math Association (SIGMA). Jun 2024 - Present
3. Led initiative to secure Overleaf licenses to FIU math students and faculty. Jul 2024
4. Vice President of Students in Graduate Math Association (SIGMA). Aug 2021 - Aug 2024
5. Organizer for Directed Reading Program for undergraduates at FIU. Fall 2020, 2021, 2022

Technical Skills

Programming Languages: MATLAB, LATEX, Python.

Experience: Mathematical modeling and numerical analysis in MATLAB. Script writing and Machine Learning for PDE/ODE using PINNs on Python.

Languages: Native English and Fluent Spanish