Diego A. Rios

5th Year Ph.D Student · Mathematical Sciences

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"If you want to live a happy life, tie it to a goal, not to people or things."

Education

Ph.D. in Mathematical Sciences   *New Jersey, USA*

New Jersey Institute of Technology   *Sept. 2018 - Present*

- GEM Associates Fellow
- GPA - 3.265

B.S. in Mathematical Sciences   *New Jersey, USA*

New Jersey Institute of Technology   *Sept. 2014 - May 2018*

- Magna Cum Laude
- Honors College

Publications

Michalopoulou, Z. H., Gerstoft, P., Rios, D., & Hodgkiss, W. S. (2021). Tracking and Inversion Using Midfrequency Signals in the Seabed Characterization Experiment. *IEEE Journal of Oceanic Engineering*.

Interests

Math	Inverse problems, modeling, acoustics, dynamical systems,
Machine Learning	Decision trees, neural networks

Research Experience

Decision Trees   *Newark, NJ*

New Jersey Institute of Technology   *Sept. 2020 - Present*

- Developed a decision tree algorithm to classify time series to their respective sediments.
- Tested the model against various signal-to-noise ratio.
- Applied techniques of machine learning to improve the algorithm.
- Mentored a high school student and introduced them to this topic.

Shallow Water Inversion   *Newark, NJ*

New Jersey Institute of Technology   *Sept. 2018 - Present*

- Further developed an inversion algorithm to approximate the path traveled by a signal.
- Compared experimental results against real world data.
- Modeled multipath arrivals using ray theory.
- Generalized the algorithm for parallel computing.

Melt Migration Near the Colorado Plateau   *Albuquerque, NM*

University of New Mexico   *July 2017 - Aug. 2017*

- Investigated the physical effects of melt migration by porous flow within continents, specifically exploring the role of dynamic pressure gradients produced as the continent moves relative to the underlying flowing mantle.
- Used MATLAB to analyze simulations for melt movement underneath the Earth's mantle.
- Investigated how the melt migrates according to dynamic pressure gradients.
- The simulations were plotted in a 3D space to demonstrate the effect of heat advection by melt and to investigate the upwind-downwind asymmetry in the weakening of a region of thicker-than-average lithosphere.

Eulerian versus Lagrangian Data Assimilation

NEW JERSEY INSTITUTE OF TECHNOLOGY

Newark, NJ
Jan. 2016 - Dec. 2016

- Used the Discrete Kalman Filter to estimate velocity field to demonstrate how blending a model with data allowed the inferring of the state of the system with better accuracy than either the model or the data alone would provide.
- The estimated flow fields were simulated with different types of observers (floating versus fixed in space) and observational data (position versus velocity measurements) to analyze the effects this had on the estimation.

Professional Experience

NJIT Department of Mathematical Sciences — *Newark, NJ*

TEACHING ASSISTANT / TEACHING RESERVE / RESEARCH ASSISTANT — *September 2018 - Present*

- Proctored exams, led recitations, and instructed courses when needed.

The Journal of the Acoustical Society of America — *Online*

JASA PEER REVIEW — *Fall 2022*

- Served as a reviewer of manuscripts submitted to JASA.

SHPE - Medtronic — *Online*

FALL 2022 STEM TALENT REVIEW SPECIALIST POOL — *Fall 2022*

- Screened first round STEM talent to the second round of the internship process.

MIT MITES — *Massachusetts, MA*

PROJECT COURSE INSTRUCTOR — *Summers 2021 - 2022*

- Created a curriculum and instructed rising high school seniors in applied math concepts and how to interpret and visualize those concepts using MATLAB.
- Supervised research ideas that were presented on a symposium at the conclusion of the program.
- Taught them LaTeX and MATLAB in order to effectively portray and explain their research project to their peers, instructors, sponsors, and general public.

NJIT - NJ Gear UP/College Bound — *Newark, NJ*

TEACHING ASSISTANT — *Summer 2019*

- Facilitated the learning process for middle school students in to help them prepare for and enroll in a college or university.
- Students participated in a four- to six-week summer program that included Saturday instruction, field trips, college tours and other support services.

Skills

Programming	MATLAB, C++, TeX, Python, Machine Learning
Languages	English, Spanish, Japanese

Extracurricular Activity

Society of Hispanic Professional Engineers — *New Jersey*

SHPE NJ PRE-COLLEGE CHAIR — *June 2022 - Present*

- Organized and coordinated events for precollege students to prepare them for college.

Society for Industrial and Applied Mathematics — *NJIT*

NJIT SIAM CHAPTER PRESIDENT — *Sept 2018 - August 2022*

- Developed professional and recreational activities for graduate students to participate in.

Acoustical Society of America — *NJIT*

ASA MEMBER — *Feb 2020 - Present*

Society of Hispanic Professional Engineers — *New Jersey*

REGION 4 GRADUATE REPRESENTATIVE — *July 2018 - May 2019*

- Represented the graduate students of the northeast SHPE region.

Academic Chair — *NJIT*

NJIT SHPE — *May 2017 - May 2018*

- Part of the executive board at NJIT SHPE
- Hosted STEM awareness sessions, professional and leadership workshops, and community service event
- Tutored students in Calculus I, II, III, Physics I, II, III, and Differential Equations

Honors & Awards

2022	**ASA School 2022**, ASA	*Englewood, CO*
2022	**2022 SIAM Student Chapter Certificate of Recognition**, SIAM	*USA*
2021	**Ahluwalia Doctoral Fellowship**, NJIT	*Newark, NJ*
2018	**GEM Associates Fellow**, NJIT	*USA*
2017	**NSF GLADE REU**, UNM	*NM, USA*
2016	**NSF EXTREEMS-QED**, NJIT	*NJ, USA*
2016	**NSF I-Corps**, NJIT	*NJ, USA*
2014	**Academic Achievement Award from the City of Newark**, City of Newark	*NJ, USA*
2014-2018	**Albert Dorman Honors College Scholar**, NJIT	*NJ, USA*
2014-2018	**The Frederick and Florence Bauder Endowment**, NJIT	*NJ, USA*

Presentations

182nd Meeting of the Acoustical Society of America — *Denver, CO*

TECHNICAL PRESENTATION — *May 2022*

• Decision Trees - Shallow Water Inversion

3 Minute Research Presentation — *Newark, NJ*

TECHNICAL PRESENTATION — *March 2022*

• Decision Trees - Shallow Water Inversion

GEM 2018 Annual Conference — *Los Angeles, CA*

TECHNICAL PRESENTATION CHALLENGE — *Sept. 2018*

• Melt Migration Near the Colorado Plateau

IEEE Meet Innovative Technology Undergraduate Research Technology Conference — *Cambridge, MA*

POSTER PRESENTER — *Nov. 2017*

• Melt Migration Near the Colorado Plateau

Garden State Undergraduate Mathematics Conference — *Ewing, NJ*

POSTER PRESENTER — *March 2017*

• Eulerian versus Lagrangian Data Assimilation

IEEE Meet Innovative Technology Undergraduate Research Technology Conference — *Cambridge, MA*

POSTER PRESENTER — *Nov. 2016*

• Eulerian versus Lagrangian Data Assimilation

NJIT Student Innovation Day — *Newark, NJ*

TECHNICAL PRESENTATION — *April 2016*

• Trans-Palpebral Self-Tonometer