

Jorge L. Gonzalez

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<https://joluigonza.github.io/index.html>

Research Interests:

Dynamical Systems, invariant manifolds, Bifurcation Theory, Perturbation Theory, ODE, PDE, computer-assisted proofs, Computational Topology, numerical methods, optimization, mathematical modeling, Celestial Mechanics, Fluid Dynamics, Mathematical Biology.

Education and Professional Credentials:

- **Assistant Professor of Mathematics, Embry-Riddle Aeronautical University, Fall 2025 -**
- Postdoctoral Fellow, Department of Biological Sciences, Charles E. Schmidt College of Science, FAU. Fall 2023
Postdoctoral Mentor: Valery Forbes
- NSF MSPRF, Georgia Institute of Technology, Atlanta GA. Fall 2020
Postdoctoral Mentor: Rafael De La Llave
- Ph.D Mathematics. Florida Atlantic University. Boca Raton FL. Spring 2020
Thesis Advisor: J.D Mireles-James and Necibe Tuncer
- Naval Research Enterprise Internship Program (NREIP) with the Office of Naval Research (ONR). Naval Postgraduate School. Monterey CA. Summer 2019.
Network measurement and cyber-attack detection using alpha stable distributions, network traffic modeling. Mentor: CDR Chad Bollmann

Publications:

“New approaches to discovering epigenetic rules of homeostasis in diverse mammal species” with Diane Genereux, Kristin Crouse, Bradley Frishman, Allyson Hindle, Elinor Karlsson, Carla Madelaire, Lucas Moreira and Valery Forbes (BMC Genomics, April 2026, primary author)

“Validated enclosure of renormalization fixed points via Chebyshev series and the DFT” with Maxime Breden and J.D Mireles-James (<https://arxiv.org/pdf/2409.20457>, Foundations of Computational Mathematics MS3434, accepted 11/25, co-principal investigator)

“Finite element approximation of invariant manifolds by the parameterization method”, with J.D Mireles-James and Necibe Tuncer (Partial Differential Equations and Applications, Vol 3, December 2022, primary author)

“Computer Assisted Proof of Drift Orbits Along Normally Hyperbolic Manifolds”, with Maciej J. Capinski, Jean-Pierre Marco, J.D. Mireles James (Communications in Nonlinear Science and Numerical Simulations, Vol 106, March 2022, 105970, co-principal investigator)

“Accurate high order computation of invariant manifolds for long periodic orbits of maps and equilibrium states of PDE” (Diss. Florida Atlantic University, 2020, primary author)

“Aggregated impulses: Towards explanatory models for self-similar alpha stable traffic”, with Chad Bollmann and Joshua Clymer (2019 13th International Conference on Signal Processing and Communication Systems (ICSPCS) IEEE, 2019, primary author)

“Towards an explanatory model for network traffic”, with Chad Bollmann and Joshua Clymer (2019 IEEE 40th Sarnoff Symposium. IEEE, 2019, primary author)

“High-order parameterization of stable/unstable manifolds for long periodic orbits of maps,” with J.D Mireles-James (SIAM Journal on Applied Dynamical Systems, 2017, Vol. 16, No. 3 : pp. 1748-1795, primary author)

Submitted:

Current Projects:

Understanding the Rules of Life (URoL), NSF funded.

Global dynamics of renormalization operators, NSF funded.

Rigorous bounds for near collision orbits in n-body problems (early stage).

Computation of rigorous solutions in fluid dynamics models over irregular domains (early stage).

Recent Research presentations:

- Discovering epigenetic rules of homeostasis in diverse mammal species, NSF Rules of Life project Workshop, Broad Institute, August 26-27, 2025
- Validated Enclosure of Renormalization Fixed Points Using Chebyshev Expansions, SIAM DS 25, Denver Colorado, May 11-15, 2025
- Computer assisted proofs of new renormalization fixed points using Chebyshev expansions, Mathematics Department Colloquium, University of North Florida, April 4, 2025
- Validated enclosure of renormalization fixed points using Chebyshev expansions, Florida Section MAA, Embry-Riddle Aeronautical University, February 21, 2025
- Validated enclosure of renormalization fixed points, Analysis and Applications seminar, FAU, October 17, 2024
- New approaches to discovering epigenetic rules of homeostasis in diverse mammal species, Florida Women in Mathematics Day 2024, FAU, April 21, 2024
- New approaches to discovering epigenetic rules of homeostasis, 2024 Research Renewal Poster Session, FAU, April 20, 2024
- New approaches to discovering epigenetic rules of homeostasis in diverse mammal species, 2024 Spring Eastern Sectional Meeting, Howard University, April 6-7, 2024
- Explanatory model of cellular homeostasis in some mammals, 2024 Spring Eastern Sectional Meeting, Howard University, April 6-7, 2024
- Computation of rigorous computer-assisted bounds of fixed points for renormalization of arbitrary period, eigenfunctions, and universal constants, 2024 Spring Eastern Sectional Meeting, Howard University, April 6-7, 2024
- Finite element approximated manifolds for PDEs by the parameterization method, ICIAM 2023, Tokyo Japan, August 21, 2023
- Computer Assisted Proof of drift orbits in some chaotic systems, SIAM Conference on Applications of Dynamical Systems (DS23), Portland Oregon, May 14-18, 2023
- Computer Assisted Proof of drift orbits in some chaotic systems, Workshop "Billiards and other Dynamical Systems" dedicated to the memory of Nikolai Chernov, University of Alabama at Birmingham, March 15-17, 2023
- Finite element approximation of invariant manifolds by the parameterization method, CDSNS Colloquium, Georgia Tech, May 13, 2022
- A proof with rigorous computations of a diffusion mechanism in a-priori chaotic systems, SIAM Conference on Applications of Dynamical Systems (DS21), Virtual, May 26, 2021
- A proof with rigorous computations of a diffusion mechanism in a-priori chaotic systems, AMS Spring Southeastern Virtual Sectorial Meeting, Georgia Tech, March 14, 2021
- Computer Assisted Proof of Drift Orbits Along Normally Hyperbolic Manifolds, CDSNS Colloquium, Georgia Tech, February 26, 2021
- A proof with rigorous computations of a diffusion mechanism in a-priori chaotic systems, FIU Mathematics seminar, FIU, January 14, 2021
- Finite element approximation of invariant manifolds by the parameterization method, CDSNS Colloquium, Georgia Tech, September 30, 2019
- Towards an explanatory model for network traffic, The 40th IEEE Sarnoff Symposium, NJIT, September 23, 2019
- Aggregated Impulses: An explanatory Model for Self-Similar and Alpha Stable Network Traffic, Naval Research Enterprise Internship Program, Naval Postgraduate School, August 9, 2019

Computer Skills:

- R (fluent), Julia (fluent), Python (fluent), MATLAB (fluent), Mathematica (fluent), Excel (fluent), Java (beginner), C++ (beginner), C (beginner)

Recent Awards and Fellowships:

- "Thank a Teacher" Certificate for excellence in teaching, Georgia Tech, 2022, 2023
- NSF grant MSPRF DMS-2001758, Georgia Institute of Technology, Fall 2020
- Stuyvesant Legacy of Excellence in STEM Scholarship, Fall 2019

Recent outreach and other activities:

- NSF FMIIF PI meeting 2024, University of Iowa, November 12-13, 2024
- NSF Rules of Life project Workshop, Broad Institute, August 27-28, 2024
- Grad professional series: Postdoc Perspectives, FAU, January 17, 2024
- FAU Transfer Connections Mentor Collective, Spring 2024
- Discovering Unknown Function (DUF) Workshop, DARPA, December 12, 2023
- NSF Rules of Life project Workshop, FAU, October 18-20, 2023
- Participated in the NSF workshop on Mathematical Biology at the Symposium on Biomathematics and Ecology Education and Research, VCU, Virginia, Fall 2023 (November 3-5, 2023)
- Co-organizer for the CDSNS seminar at Georgia Tech, Fall 2022, Spring 2023
- Co-organizer for the M@th Hub workshop: Overcoming the Computational Complexity of Large Dynamical Systems with Parallel Computations, Georgia Tech, Fall 2022
- Instructor for the Probability and Statistics section of the 2022 MS Analytics Bootcamp, Georgia Tech, Summer 2022
- Mentor for REU at Georgia Tech: Dynamical Systems with computer assistance, Summer 2021
- Co-organizer of special session on advances in computational dynamics, AMS Spring Southeastern Virtual Sectorial Meeting, Georgia Tech, March 13-14, 2021

- Georgia Tech School of Mathematics Equity Diversity and Inclusion (EDI) Postdoc Committee , 2020
- Mentor for a Science and Engineering Apprenticeship Program (SEAP) student as part of the NREIP, Naval Postgraduate School, Summer 2019