Jorge L. Gonzalez

Department of Mathematics, Embry-Riddle Aeronautical University
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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:

"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)

"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)

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

"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)

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

"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)

Submitted:

"Validated enclosure of renormalization fixed pointsvia Chebyshev series and the DFT" with Maxime Breden and J.D Mireles-James (https://arxiv.org/pdf/2409.20457, Foundations of Computational MathematicsMS3434)

Current Projects:

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

Global dynamics of renormalization operators, NSF funded.

Recent Research presentations:

- 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
- Parameterization Method for Parabolic PDEs, AG Nichtlineare Partielle Differentialgleichungen at Karlsruhe Institute of Technology, Karlsruhe, June 26, 2018
- Parameterization Method for Parabolic PDEs, Dynamics, Topology and Computations DyToComp, Bedlewo, June 18-23, 2018
- Parameterization Method for Parabolic PDEs, Dynamical Systems Seminar at Jagiellonian University, Krakow, June 12, 2018
- Parameterization Method for Parabolic PDEs. Llavefest: A Broad Perspective on Finite and Infinite Dimensional Dynamical Systems. Poster Session, Barcelona, June 12-16, 2017
- Parameterization Method for Parabolic PDEs. SIAM Conference on Applications of Dynamical Systems. Poster Session, Snowbird, May 21-25, 2017
- Parameterization Method for Stable/Unstable Manifolds of Periodic Points for Maps. Special Session (Dynamics and Computations), The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, July 1-5, 2016
- Parameterization Method for Stable/Unstable Manifolds of Periodic Points for Maps. Poster Session, Dynamics of Evolution Equations, CIRM, Marseille, March 21-25, 2016
- McGehee's proof of the Stable and Unstable Manifold Theorem via isolating blocks, Analysis Seminar, Florida Atlantic University, 2016
- Parametrization Method for Stable/Unstable Manifolds of Periodic Points for Maps, Analysis Seminar, Florida Atlantic University, 2016
- Parameterization Method for Stable/Unstable Manifolds of Periodic Points for Maps. Poster Session, CMS Winter, Montreal, December 4-7, 2015

Recent Teaching Experience:

- Adjunct Instructor at FAU, 2024-2025
- Teaching Postdoctoral Fellow at Georgia Tech, 2021-2023
- Graduate Teaching Assistant at Florida Atlantic University, 2013-2020
- Adjunct Instructor at Florida International University, 2017-2018

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
- Stuyvesant Legacy of Excellence in STEM Scholarship, Fall 2018
- Gus and Sharon Pearthree Math Graduate Scholar Award, Fall 2017
- FAU Graduate Grant, Fall 2016
- Delores Auzenne Fellowship, Fall 2016

Recent outreach and other activities:

- NSF FMitF 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 Unknome 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

Citizenships: United States of America