Jorge L. Gonzalez

School of Mathematics, Georgia Institute of Technology
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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, Computational Neuroscience, cognitive modeling, Machine Learning, stochastic processes, network traffic, Percolation Theory, Ramsey Theory.

Education and Professional Credentials:

- 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
- BS Physics. Florida International University. Miami FL. Summer 2009
- BS Mathematics. Florida International University. Miami FL. Spring 2009

Publications:

"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)

Preprints:

"Finite element approximation of invariant manifolds by the parameterization method", with J.D Mireles-James and Necibe Tuncer

Additional Projects:

- Seagrass Restoration Project, Biscayne National Park, Village of Key Biscayne, 82-month monitoring report with Amanda Bourque, Smart-Sciences, Fall 2018
- Spontaneous Symmetry Breaking with Rajamani Narayanan, McNair Program, Florida International University, Spring 2009

- Hilbert's 10th Problem: Study of Exponential Diophantine Sets with Steve Simpson, MASS Program, Pennsylvania State University, Fall 2007
- Study of Regular Variation with Omri Sarig, MASS Program, Pennsylvania State University, Fall 2007
- Study of Modular Curves with Anatole Katok, MASS Program, Pennsylvania State University, Fall 2007
- Cryptography Project with Ravi Ramakrishna, SMI Programs, Cornel University, Summer 2007

Research presentations:

- 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
- Gauss Sums and Reciprocity Laws. BS Mathematics Presentation, Florida International University, Fall 2009
- Spontaneous Symmetry Breaking. McNair Program, Florida International University, Fall 2009
- Hilbert's 10th Problem: Study of Exponential Diophantine Sets, Mathematics Advanced Study Semesters (MASS), Penn State University, Fall 2007
- Study of Regular Variation, Mathematics Advanced Study Semesters (MASS), Penn State University, Fall 2007
- Study of Modular Curves. Mathematics Advanced Study Semesters (MASS), Penn State University, Fall 2007
- Outreach presentation on Cryptography. Summer Math Institute (SMI), Cornell University, Summer 2007

Teaching Experience:

- Teaching Postdoctoral Fellow at Georgia Tech, current
- Graduate Teaching Assistant at Florida Atlantic University, 2013-2020
- Adjunct Instructor at Florida International University, 2017-2018
- Teaching Assistant at University of California San Diego, 2009-2012
- Mathematics/Physics Tutor/Grader at Florida International University, 2007-2009

Computer Skills:

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

Awards and Fellowships:

- 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
- Provosts Fellowship, Fall 2013
- FAU Graduate Grant, Fall 2013
- Phi Beta Kappa, Spring 2009
- Award for Outstanding Academic Achievement in Mathematics, Spring 2009
- McNair Post Baccalaureate Achievement Fellow, 2008-2009
- Honor College Student at Florida International University, Fall 2005
- Florida NU Balanced Man Scholarship Finalist, Fall 2004
- Robert Leo Thomas Scholarship
- Florida Bright Futures Scholarship, Fall 2004

Outreach and other activities:

- Mentor for REU at Georgia Tech, 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
- Instructor for Graduate Analysis problem-solving sessions, Florida Atlantic University, Fall 2016
- Instructor for Graduate Algebra problem-solving sessions, Florida Atlantic University, Summer 2015
- GPSA Graduate Research Day peer Judge, Florida Atlantic University, Spring 2015
- Math Day Volunteer, Florida Atlantic University, 2015, 2014, 2013
- Outreach presentation on Cryptography, Summer Math Institute (SMI), Cornell University, Summer 2007

Citizenships: United States of America