

GABRIELA JARAMILLO

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CONTACT INFORMATION

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EMPLOYMENT & EDUCATION

Assistant Professor, University of Houston, TX	2018 - Present
NSF Mathematical Science Postdoctoral Fellow, The University of Arizona, AZ	2015 - 2018
Ph.D. Mathematics, University of Minnesota, MN	2009 - 2015
M.S. Applied Mathematics, Rochester Institute of Tech., NY	2007 - 2009
B.S. Mechanical Engineering, Rochester Institute of Tech., NY	2003 - 2007

RESEARCH INTERESTS

Nonlinear PDE's, Pattern Forming Systems, Integro-differential Equations.

GRANTS

NSF DMS-1911742: *The effects of nonlocal coupling in oscillatory media* (\$ 175,783) 2019 - 2022

PUBLICATIONS & PREPRINTS

- G. Jaramillo, *Rotating waves in oscillatory media with nonlocal interactions and their normal form*. Submitted (2021).
- L. Cappanera, G. Jaramillo, C. Ward, *Numerical methods for a diffusive class of nonlocal operators*. Submitted (2020).
- G. Jaramillo, S. Venkataramani, *A modified Split Bregman algorithm for computing microstructures through Young measures*. Accepted to SIAM Multiscale Modeling and Simulation MMS (2019).

- G. Jaramillo, S. Venkataramani, *Target patterns in a 2-d array of oscillators with nonlocal coupling*. Nonlinearity 31.9 (2018): 4162.
- G. Jaramillo, A. Scheel, Q. Wu, *The effect of impurities on striped phases*. Proc. Roy. Soc. Edinb. 149.1 (2019): 131-168.
- G. Jaramillo, A. Scheel, *Pacemakers in a large array of oscillators with nonlocal coupling*. J. Differ. Equations 260.3 (2016): 2060-2090.
- G. Jaramillo, *Inhomogeneities in 3 dimensional oscillatory media*. Netw. Heterog. Media 10.2 (2015) 387-399.
- G. Jaramillo, A. Scheel, *Deformation of striped patterns by inhomogeneities*. Math. Meth. Appl. Sci. 38.1 (2015): 51-65.
- G. Jaramillo, C. O. Lousto, *Study of multi-black-hole and ring-singularity apparent horizons*. Phys. Rev. D 84.10 (2011): 104011.

AWARDS

- Teaching and Service Prize for non-tenure faculty, U. Arizona (Fall 2016 - Spring 2017).
- SIAM Early Career Travel Award for the *Conference on Applications of Dynamical Systems*, Snowbird, UT, May 21-25, 2017.
- NSF Mathematical Science Postdoctoral Fellowship (2015-2018).
- SIAM Student Travel Award for the *Conference on Applications of Dynamical Systems*, Snowbird, UT, May 17-21, 2015.
- Sigma Xi Graduate Research Award, U. Minnesota (2014).
- Doctoral Dissertation Fellowship Award, U. Minnesota (Fall 2014 - Spring 2015).
- SIAM Student Travel Award for the *Conference on Nonlinear Waves and Coherent Structures*, Cambridge, UK, August 11-14, 2014.

INVITED TALKS

- *A normal form for rotating waves solutions in oscillatory media with nonlocal coupling*. One World Dynamics Seminar, September 2020.
- *A numerical method for a diffusive class of nonlocal operators*. MU-MST Analysis Seminar via zoom, July 2020.
- *Some tools for understanding pattern formation in oscillatory media with nonlocal coupling*. Analysis, Dynamics, and Applications Seminar, Department of Mathematics, University of Arizona, AZ, March 2020.
- *Moving inhomogeneities in oscillating chemical reactions*. SIAM Conference on PDE, La Quinta, CA, December 11-14, 2019.
- *Moving inhomogeneities in oscillating chemical reactions*. SIAM Conference on PDE TX-LA, Southern Methodist University, Dallas, TX, November 1-3, 2019.

- *Rotating spirals in oscillatory media with nonlocal coupling.* Equadiff 2019, Leiden, The Netherlands, July 8-12, 2019.
- *Stationary and moving defects in oscillatory media.* SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 19-23, 2019.
- *Heterogeneities in oscillatory media.* SIAM Annual Meeting, Portland, OR, July 9-13, 2018.
- *Moving inhomogeneities in oscillating chemical reactions.* SIAM Conference on Nonlinear Waves and Coherent Structures, Orange, CA, June 11-14, 2018.
- *Moving inhomogeneities in chemical oscillations.* SIAM Conference on Analysis of Partial Differential Equations, Baltimore, MD, December 9-12, 2017.
- *Target waves in a 2-d viscous eikonal equation.* SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 21-25, 2017.
- *Pacemakers in a 2-d array of oscillators with nonlocal coupling.* SIAM Conference on Nonlinear Waves and Coherent Structures, Philadelphia, PA, August 8-14, 2016.
- *Inhomogeneities in spatially extended pattern forming systems.* SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ, December 7-10, 2015.
- *Pacemakers in a large array of oscillators with nonlocal coupling.* Conference on PDEs and Free Boundary Problems, University of Pittsburgh, PA, March 11-14, 2015.
- *Pacemakers in a large array of oscillators with nonlocal coupling.* SIAM Conference on Nonlinear Waves and Coherent Structures, Churchill College, University of Cambridge, UK, August 11-4, 2014.
- *Defects in chemical oscillations and related phenomena.* School of Mathematics Open House, University of Minnesota, MN, March 31, 2014.

CONTRIBUTED TALKS

- *A brief introduction to pattern formation.* Graduate Student Seminar, Department of Mathematics, University of Houston, TX, October 2020.
- AWM Seminar, Department of Mathematics, University of Houston, TX, March 2019.
- *Pattern formation in oscillatory media.* Networks Seminar, Department of Mathematics, University of Houston, TX, January 2019.
- *Two methods for approximating microstructures.* PDE Seminar, Department of Mathematics, University of Houston, TX, October 2018.
- *Ribbons of infinite length and more.* APS March Meeting, New Orleans, LA, March 13-17, 2017.
- *2-D array of oscillators with nonlocal coupling.* AMS Fall Central Sectional Meeting, University of St. Thomas, Minneapolis, MN, October 28-30, 2016.
- *The effects of inhomogeneities in spatially extended pattern forming systems.* 3-Min Thesis Session, SIAM Student Chapter University of Minnesota, MN, April 9, 2015.
- *Patterns and inhomogeneities in spatially extended systems.* Boston University / Keio University Workshop, Boston University, September 15-19, 2014.

- *Localized perturbations of the complex Ginzburg-Landau equation: recovering Fredholm properties via Kondratiev spaces*. SIAM Conference on Analysis of Partial Differential Equations, Orlando, FL, December 7-10, 2013.

POSTERS & CONFERENCES

- *Modified Split-Bregman iteration for problems in elasticity* (poster). Multiscale Theory and Computation, Minneapolis MN, September 23-25, 2017.
- *Pacemakers in a large array of oscillators with nonlocal coupling* (poster). SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 17-21, 2015.
- *Pacemakers in a large array of oscillators with nonlocal coupling* (poster). KUMU Conference on PDE's, Dynamical Systems and Applications, Lawrence, KS, April 18-19, 2015.
- *Pacemakers in a large array of oscillators with nonlocal coupling* (poster). Algebraic Topology in Dynamics, Differential Equations, and Experimental Data, IMA, Minneapolis MN, February 10-14, 2014.
- *Localized perturbations of striped patterns: recovering Fredholm properties via Kondratiev spaces* (poster). Joint US-Japan Conference for Young Researchers on Interactions among Localized Patterns in Dissipative Systems, IMA, Minneapolis, MN, June 3-7, 2013.
- *Localized perturbations of striped patterns: recovering Fredholm properties via Kondratiev spaces* (poster). First International Conference on Dynamics of Differential Equations, Georgia Tech, Atlanta, GA, March 16-20, 2013.
- Career Options for Women in Mathematical Science, IMA, Minneapolis, MN, March 3-5, 2013.

MENTORING

- Postdoc: Cory Ward
Numerical methods for nonlocal operators Fall 2019 - Present

Undergraduate

- Shravani Deo and Ricardo Del Rio
REU: Nonlocal coupling effects on a network of neurons June 2020 - July 2020
- Shravani Deo and Ricardo Del Rio
Spiral waves in cellular automata with nonlocal interactions Fall 2019 - Spring 2020
- Catherine Weibel
Ammonite fossil curves: An exploration of fractal dimension Fall 2018
Honors project for the 'Introduction to Dynamical Systems' course (Math 454) at the University of Arizona.
- Erica Bosset and Jason Dominick
Stability regions for a biologically inspired neural network Fall 2017
Independent Study, University of Arizona.

REVIEWED ARTICLES IN

- Nonlinearity

SERVICE

Organization:

- Part of organizing committee for the SIAM Conference on Applications of Dynamical Systems, May 23-27, 2021.
- Co-organizer of SIAM minisymposium, *Mechanisms underlying Dynamical Processes in Cellular and Systems Physiology*, SIAM Conference on Applications of Dynamical Systems, Virtual Conference, May 23-27, 2021.
- Co-organizer of SIAM minisymposium, *Discrete and continuous systems with nonlocal interactions*, SIAM Conference on Nonlinear Waves and Coherent Structures, Bremen, Germany, July 27-30, 2020.
- Co-organizer of SIAM minisymposium, *Defects and inhomogeneities in spatially extended Systems*, SIAM Annual Meeting, Portland, OR, July 9-13, 2018.
- Co-organizer of SIAM minisymposium, *PDE models for pattern forming systems*, SIAM Conference on Analysis of Partial Differential Equations, Baltimore, MD, December 9-12, 2017.
- Co-organizer of SIAM minisymposium, *Nonlocal behavior in biological applications*, SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, May 21-25, 2017.
- Co-organizer of the *Analysis, Dynamics, and Applications Seminar*, U. Arizona, Fall 2016 - Present.
- Organizer of the *Spectral and Dynamical Stability Seminar*, U. Minnesota, Fall 2013- Spring 2014.

Outreach:

- Organizer of the Math Modeling Club, Spring 2020.
- Organizer for Houston Math Teachers' Circle, Fall 2019-Spring 2020.
- Mentor for UH/HISD/COE STEM Summer Camp, July 16-17, 2019.
- Faculty adviser for the AMS student chapter at the University of Houston since April 2019.
- Co-organizer of the *Math Teacher's Circle*, U. Arizona Fall 2016 - Spring 2018.

TEACHING EXPERIENCE

University of Houston

Math 3363: Introduction to Partial Differential Equations

Spring 2021

Partial differential equations and boundary value problems, Fourier series, the heat equation, vibrations of continuous systems, the potential equation, spectral methods.

Math 3331: Differential Equations Spring 2021

Systems of ordinary differential equations; existence, uniqueness and stability of solutions; initial value problems; bifurcation theory; Jordan form; higher order equations; Laplace transforms.

Math 4362: Theory of Diff. Eq. and Nonlinear Dynamics Spring 2020

ODE as models for systems in biology, physics, and elsewhere. Existence and uniqueness of solutions, linear theory, stability of solutions and bifurcations in parameter space.

Math 4335: Introduction to PDE I Fall 2019

Method of characteristics, derivation of transport, heat, and wave equation, initial and boundary value problems, Fourier series, and harmonic functions.

Math 1451: Accelerated Calculus II Spring 2019

Fast paced course covering vectors, equations of lines and planes, multivariable calculus, Greens' and Stokes' Theorem, and applications.

Math 1450: Accelerated Calculus I Fall 2018

Fast paced course covering derivatives, integrals, sequences and series, and applications.

The University of Arizona

Advanced ODE: Spring 2018

General theory of initial value problems, linear systems and phase portraits, linearization of nonlinear systems, stability and bifurcation theory, an introduction to chaotic dynamics.

UTA Seminar: Fall 2017

The seminar is geared towards undergraduate students who are working as teaching assistants. It consists of a series of workshops designed to provide training in tutoring, grading, and lecturing. It culminates with students presentations on a math subject of their choice.

Applied PDE: Spring 2017

Sturm-Liouville operators, separation of variables, distributions, Green's functions, Fourier series, Fourier Transform, and the method of characteristics. Applications include wave, diffusion, and Laplace's equation.

Analysis of ODE: Fall 2016

Linear and nonlinear equations, basic solution techniques, qualitative and numerical methods, systems of equations, applications drawn from physical, biological and social sciences.

University of Minnesota

Advanced Calculus I: Summer 2014

Axioms for the real numbers. Techniques of proof for limits, continuity, uniform convergence. Rigorous treatment of differential/integral calculus for single-variable functions.

College Algebra: Summer 2011
Algebra, analytic geometry explored in greater depth than is usually done in three years of high school mathematics.

Teaching Assistant:

Calculus I	Spring 2015
CSE Multivariable Calculus	Fall 2011-Spring 2013
Differential Equations and Linear Algebra	Spring 2011
CSE Calculus II	Fall 2010
Calculus II	Spring 2010
Calculus I	Fall 2009

PROFESSIONAL EXPERIENCE

Stanley Bostitch, East Greenwich RI June - November 2006

Design Engineer (Co-op Assignment)

- Performed stress analysis for nail gun components using software package ANSYS

Corning Tropel, Fairport NY March - August 2005

Design Engineer (Co-op Assignment)

- Created detailed drawings of mechanical assemblies for metrology instruments
- Contributed in the design of mechanical components for new metrology instruments