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RESEARCH INTERESTS

Pattern Formation, Coherent Structures, Dynamical Systems, PDE, Mathematical Modeling

EDUCATION

- Ph.D. Mathematics** *June 2016*
 College of Science and Engineering, University of Minnesota-Twin Cities, Minneapolis, MN
 Thesis: Pattern formation in the wake of external mechanisms
 Advisor: Arnd Scheel
- M.Sc. Mathematics** *January 2014*
 College of Science and Engineering, University of Minnesota-Twin Cities, Minneapolis, MN
- B.S. Mathematics & B.A. Physics** *both with High Honors* *May 2011*
 College of Natural Science, Michigan State University, East Lansing, MI

EMPLOYMENT

- Assistant Professor** *2019-Present*
 Boston University, Department of Mathematics and Statistics,
 ○ MA 776 - Partial Differential Equations *Spring 2022*
 ○ MA226 - Differential Equations *Fall 2021, Spring 2020*
 ○ MA124 - Calculus II *Fall 2021*
 ○ MA876 - Topics in PDE (“Mathematics of Pattern Formation”) *Spring 2021*
 ○ MA771 - Introduction to Dynamical Systems *Fall 2020*
 ○ MA573 - Qualitative theory of ODEs *Fall 2019*
- NSF Postdoctoral Fellow** *2016 - 2019*
 Boston University, Department of Mathematics and Statistics,
 ○ MA226 - Differential Equations *Spring 2019*
 ○ MA573 - Qualitative theory of ODEs *Fall 2018*
 ○ MA124 - Calculus II *Spring 2018*
 ○ MA775 - Ordinary Differential Equations *Fall 2017*
- UMN Doctoral Dissertation Fellow** *2015 - 2016*
 University of Minnesota, School of Mathematics,
- NSF Graduate Fellow** *2012 - 2015*
 University of Minnesota, School of Mathematics,
 Pattern Formation from a Dynamical Systems Viewpoint
- Graduate Teaching Assistant**
 University of Minnesota, School of Mathematics,
 ○ MATH 3592H - 3593H - Honors Mathematics I & II *2013 - 2015*
 ○ MATH 1271 - Calculus I *2011 - 2012*
- Research Aid** *May 2010 - May 2011*
 Michigan State University, Chemistry and Mathematics Departments
 Mathematical modeling of Dye-Sensitized Solar Cells, Advisor: Keith Promislow
- REU Participant** *May 2009 - July 2009*
 University of Minnesota, School of Mathematics
 Modeling and Dynamics of Liesegang Patterns, Advisor: Arnd Scheel

Professorial Assistant

August 2007 - May 2009

Michigan State University, Chemistry and Mathematics Departments

Basins of Attractions and Bi-stability of Piecewise-Linear Discontinuous Maps, Advisor: Keith Promislow

GRANT FUNDING

- NSF Applied Math - Research Grant with two year REU supplement (DMS-2006887, 50208132) 2020 - 2023

HONORS, AWARDS, AND SCHOLARSHIPS

- Outstanding Reviewer Award, Nonlinearity March 24, 2021
- Trusted Reviewer, IOP publishing September 24, 2020
- Outstanding Reviewer Award, Nonlinearity February 3, 2017
- SIAM Student Chapter Certificate of Recognition, University of Minnesota May 6, 2016
- 2014-2015 Outstanding TA Award, School of Mathematics, University of Minnesota April 7, 2016
- NSF Postdoctoral Fellowship January 2016
- Red Sock Award for best poster, SIAM Conference on Application of Dynamical Systems May 21, 2015
- Doctoral Dissertation Fellowship, University of Minnesota April 2015
- SIAM Student Travel Award, Conference on Application of Dynamical Systems May 17 - 21, 2015
- AMS Student Travel Award, AMS Central Sectional Meeting March 13 - 15, 2015
- SIAM Student Travel Award, Conference on Nonlinear Waves and Coherent Structures August 11 - 14, 2014
- Charles and Dorothy Andrew Bird Award, Sigma Xi Society, UMN Chapter May 2013
- National Science Foundation Graduate Research Fellowship April 2012
- MSU College of Natural Science Dean's List 2007 - 2011
- Mathematical Endowed Scholarship, MSU Dept. of Mathematics May 2011
- L.C. Plant Award, MSU Dept. of Mathematics May 2010
- Member of Honors College, MSU 2007 - 2011
- Distinguished Freshman Scholarship, MSU 2007 - 2011

JOURNAL PUBLICATIONS

- R. Goh, C.E. Wayne, R. Welter. **Asymptotic approximation of a modified compressible Navier Stokes system**, Indian. Univ. Math. J. accepted.
- R. Goh, T. J. Kaper, T. Vo. **Delayed Hopf bifurcation and space-time buffer curves in the Complex Ginzburg-Landau equation**, IMA Journal of Applied Mathematics, accepted.
- R. Goh, B. de Rijk. **Spectral stability of pattern-forming fronts in the complex Ginzburg-Landau equation with a quenching mechanism**, Nonlinearity 35 (1), 170 (2021).
- K. Chen, Z. Deiman, R. Goh, S. Jankovic, and A. Scheel. **Strain and defects in oblique stripe growth**, Multiscale Model. Simul., 19(3), 1236–1260 (2021).
- S. Chhabra, L. Liu, R. Goh, A. Warmflash, Aryeh **The timing of signaling events in the BMP, WNT, and Nodal cascade determines self-organized fate patterning in human gastruloids**, PLOS Biology 17(10): e3000498, (2021)
- M. Avery, R. Goh, O. Goodloe, A. Milewski, A. Scheel, **Growing stripes, with and without wrinkles**, SIAM J. Appl. Dyn. Sys., 18 (2019), 1078 – 1117.
- R. Goh, C.E. Wayne. **Vortices in stably-stratified rapidly rotating Boussinesq convection**, Nonlinearity, 32, (2019), R1-R52.
- R. Goh, A. Scheel. **Pattern-forming fronts in a Swift-Hohenberg equation with directional quenching - parallel and oblique stripes**, J. London Math. Soc, 98 (2018), 104-128
- Z. Wang, R. Goh, K. Bazargan, A. Scheel, N. Saraf. **Stochastic implementation and analysis of dynamical system similar to the logistic Map**, IEEE Transactions on Very Large Scale Integration Systems 99, (2016), 1-13.

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- R. Goh, R. Beekie, D. Matthias, J. Nunley, A. Scheel. **Universal wavenumber selection laws in apical growth**, Phys. Rev. E. 94, (2016), 022219.
 - R. Goh, A. Scheel. **Pattern formation in the wake of triggered pushed fronts**, Nonlinearity 29 (2016), 2196. (a 2016 highlighted paper)
 - R. Goh, A. Scheel. **Hopf bifurcation from fronts in the Cahn-Hilliard equation**, Arch. Ration. Mech. An. 3 (2015), 1219-1263.
 - R. Goh, A. Scheel. **Triggered fronts in the complex Ginzburg Landau equation**, J. of Nonlinear Science 24 (2014), 117-144.
 - R. Goh, S. Mesuro, A. Scheel. **Spatial wavenumber selection in recurrent precipitation**, SIAM J. Appl. Dyn. Sys. 10 (2011), 360-402.

BOOK CHAPTERS, MAGAZINE ARTICLES, AND REVIEWS

- R. Goh, **Quenched Stripes: Wavenumber Selection and Dynamics**, DSWeb online magazine, July 2021.
- R. Goh, S. Mesuro, A. Scheel. **Coherent structures in reaction-diffusion models for precipitation**, Special volume on "Precipitation patterns in reaction-diffusion systems", Research Signpost (2010), 73-93.

TALKS AND POSTERS

- **Stability and dynamics of quenched stripes**,
 - (Seminar talk) Brown Univ. LCDS Seminar, November 2021.
- **Quenched stripes: wavenumber selection and dynamics**,
 - (Workshop talk) Oberwolfach Workshop on Dynamics of Waves and Patterns, August 2021.
- **Growing oblique stripes**,
 - (Minisymposium talk) SIAM Conf. on Applications of Dynamical Systems, May 2021
 - (Seminar talk) Univ. of Sydney Applied Math Seminar, May 2021.
 - (Seminar talk) Univ. of Tennessee, Knoxville PDE seminar, February 2021
 - (Seminar talk) BU Dynamics Seminar, February 2021.
- **Dynamics and PDE applications of Matrix Riccati Equations**,
 - (Seminar talk) BU Dynamics Seminar, September 2020.
- **Stability of growing stripes in the complex Ginzburg-Landau equation**,
 - (Minisymposium talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Bremen, Germany, July 2020 (canceled)
 - (Minisymposium talk) SIAM Conf. on Analysis of PDE, La Quinta, CA, December, 2019
 - (Minisymposium talk) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May, 2019

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- **Patterns in growing domains/Pattern formation in the wake of growth mechanisms,**
 - (Seminar Talk) Brandeis University Anytopic Seminar, Waltham, MA, Dec. 5th, 2019.
 - (Minisymposium talk) IMACS Nonlinear Evolution Equations and Wave Phenomena, Athens, GA, Apr. 19, 2019.
 - (Seminar Talk) Tufts University Dynamics Seminar, Boston, MA, Oct. 19th, 2018.
 - (Minisymposium talk) Conference on Mathematics of Wave Phenomena, Karlsruhe, Germany, Jul. 24, 2018.
 - (Minisymposium talk) SIAM Annual Meeting, Portland, OR, July 12, 2018.
 - (Seminar Talk) Brown University Dynamics seminar, Providence, RI, Feb. 26, 2018.
 - (Invited talk) SIAM central sectional meeting, Fort Collins, CO, Oct. 1, 2017.
 - (Seminar Talk) U. of Arizona Analysis seminar, Tuscon, AZ, Oct. 10, 2017.
 - (Seminar Talk) U. Mass. Boston Physics Colloquium, Boston, MA, Sept. 21, 2017.
 - (Seminar Talk) Knobloch Research Group, Berkeley, CA, Jul. 6, 2016.
 - **Vortices in rapidly rotating Boussinesq convection,**
 - (Seminar talk) Analysis and Modeling Oberseminar, Institut für Analysis, Dynamik und Modellierung, Stuttgart, Germany, July 2018.
 - (Poster) SIAM Conf. on Nonlinear Waves and Coherent Structures, Anaheim, CA, June, 2018.
 - (Minisymposium talk) SIAM Conf. on Analysis of PDE, Baltimore, MD, Dec., 2017.
 - (Seminar talk) MIT seminar on numerical methods for PDE, Cambridge, MA, Nov. 15, 2017.
 - **Oblique stripes in a triggered Swift-Hohenberg equation,**
 - (Seminar talk) BU-KEIO Workshop, Boston, MA, Jun 26 2017.
 - (Poster) FIDDS17-Llavest, Barcelona, Spain, Jun. 14, 2017.
 - (Mini-symposium talk) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May 24, 2017.
 - (Seminar talk) Knobloch Research Group, Berkeley, CA, May 18, 2017.
 - (Seminar talk) Analysis and Modeling Oberseminar, Institut für Analysis, Dynamik und Modellierung, Stuttgart, Germany, Apr. 3, 2017.
 - **Hopf bifurcation from fronts in the Cahn-Hilliard equation,**
 - (Invited Talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Philadelphia, Aug. 7-11, 2016.
 - (Invited Talk) SIAM Conf. on Analysis of PDE, Scottsdale, AZ, Dec. 7-10, 2015.
 - (Invited Talk) Applied Math Seminar, Michigan State Univ., East Lansing, MI, Dec. 4, 2015.
 - (Invited Talk) Special Session on Nonlinear waves, AMS central sectional meeting, East Lansing, MI, Mar. 14, 2015.
 - (Contributed Talk) SIAM Conf. on Nonlinear Waves and Coherent Structures, Cambridge, England, Aug. 12, 2014.
 - **Front-dynamics and pattern selection in the wake of triggered instabilities,**
 - (Poster) SIAM Conf. on Applications of Dynamical Systems, Snowbird, UT, May 19, 2015.
 - (Poster) KUMU Conf. in PDE, Dynamical Systems and Applications, Lawrence, KS, Apr. 18, 2015.

- **Pattern formation in the wake of external mechanisms**,
 - (Poster) BU Conf. on Analysis of Partial Differential Equations using Dynamical Systems Techniques, Boston, MA, Jun. 1-3, 2016.
 - (Poster) KUMU Conf. in PDE, Dynamical Systems and Applications, Columbia, MS, Apr. 23, 2016.
 - (Poster) UMN Doctoral Research Showcase, Minneapolis, MN, Apr. 6, 2016.
 - (Invited Talk) UMN School of Math Open House, Minneapolis, MN. Apr. 2, 2015.
 - (Seminar Talk) Junior Colloquium, Department of Mathematics, University of Minnesota, Nov. 11, 2015.
- **Front-dynamics and pattern selection in semi-bounded domains**, (Contributed Talk) SIAM Conf. on Analysis of PDE, Lake Buena Vista, Florida, Dec. 10, 2013.
- **Shear band formation in bulk metallic glasses**, IMA Workshop on Mathematical Modeling in Industry, Minneapolis, MN, Aug. 16, 2013.
- **Triggered fronts in the complex Ginzburg Landau equation**, (Poster) IMA Special Workshop on Interactions among Localized Patterns in Dissipative Systems, Minneapolis, MN, Jun. 4, 2013
- **Coherent triggered fronts in complex Ginzburg Landau**, (Poster) Sigma Xi Chapter meeting, Minneapolis, MN, May 5, 2013
- **Nature's art: pattern formation in the world around us**, Junior Colloquium, Department of Mathematics, University of Minnesota, Oct. 17, 2012.
- **Liesegang patterns: phase-field dynamics**, Summer Workshop on Analysis, Topology and Applications, Department of Mathematics, University of Wisconsin-Eau Claire, Jul. 10, 2009.

SERVICE

○ Referee

DCDS, Nonlinearity, Physica D, SIAM J. Appl. Dyn. Sys., ZAMP, SIAM J. Math. Anal., J. of Chem. Phys., J. Math. Anal. and Appl., J. Dyn. and Diff. Eq., DCDS-S, J. of Diff. Eq.,

○ BU Committees

Stats hiring committee

Fall 2021-Spring 2022

Graduate studies committee

Fall 2019-Present

Dynamics postdoc hiring committee

Fall 2019-Spring 2020

Made recommendations for undergraduate applied math curriculum

Fall 2019-Fall 2021

○ Organizer

Dynamics Seminar, Boston University

Fall 2017 - Present

Brown-BU PDE seminar, Boston University

Fall 2017 - Present

School of Mathematics Junior Colloquium, University of Minnesota

Fall 2012 - Spring 2014

○ Mini-symposium Organizer

SIAM Conf. on Applications of Dynamical Systems

May 2021

SIAM Conf. on Nonlinear Waves and Coherent Structures (Canceled)

July 2020

SIAM Annual Meeting

July 2018

SIAM Conf. on Nonlinear Waves and Coherent Structures

June 2018

SIAM Conf. on Applications of Dynamical Systems

May 2017

○ Doctoral Students

Vanny Khon, Department of Mathematics and Statistics, Boston University

Current

Benjamin Hosek, Department of Mathematics and Statistics, Boston University

Current

○ BU student research projects, independent study, and reading groups supervision

Numerical methods for PDE Graduate Reading Group

Spring 2022

Plzak, Zoe, and Remler, Ava, Simple models for patterns on growing domains

Fall 2021-Spring 2022

Nonlinear Functional Analysis Graduate Reading Group

Fall 2021

Conley Index Graduate Reading Group

Fall 2020

Mussi, Jacob, Interaction of coherent structures in a saturated NLS equation

Summer 2020 - Spring 2021

- Evdavev, Khai, Simple PDE models of early stage gastrulation in mammals. *Fall 2020-Spring 2021*
 Evdavev, Khai, Independent study in chaotic dynamical systems. *Spring 2020*
- **Ph.D. committees served on**
- Siemer, Lars, External Reader, Applied Mathematics, University of Bremen *Spring 2022*
 Ma, Jingwei, Reader, Department of Mathematics and Statistics, Boston University *Spring 2021*
 Welter, Roland; Reader, Department of Mathematics and Statistics, Boston University *Spring 2021*
 Zhang, Ying; Reader, Department of Mathematics and Statistics, Boston University *April 2020*
 Parker, Ross; External Reader, Division of Applied Mathematics, Brown University *December 2019*
- **REU mentoring**
- (organizer and mentor) NSF REU: Patterns, Growth, and Dynamics, Boston University *Summer 2021*
 (co-mentor) Complex Systems, School of Mathematics, University of Minnesota *Summer 2015*
 (co-mentor) Pattern Formation in Chemotaxis, School of Mathematics, University of Minnesota *Summer 2012*
- **Seminar/Panel talk**
- BU M.A.A. seminar talk on patterns in nature and life as a mathematician *November 19, 2019*
 BU graduate student workshop on NSFGRP applications *September 30, 2019*
 Applying to Postdocs, Boston University AMS student chapter *April 20, 2017*
 Math Postdoc Panel, Brown University SIAM Student Chapter *March 23rd, 2016*
 Graduate School Panel Discussion, Macalester College *July 23, 2015*
 Graduate School Panel Discussion, IMA Applied Math REU *July 16, 2013*
- **President; Vice President**
- SIAM Student Chapter, University of Minnesota *2013 - 2014; 2014-2016*
- **Graduate Student Peer-Mentor**
- School of Mathematics, University of Minnesota *2013-2015*
- **Organizer/Judge**
- Mathematical Contest in Modeling, University of Minnesota *Fall 2012- Fall 2015*
- **Volunteer and Exhibit Organizer**
- Mathematical Toys, Math and Science Family Fun Fair, University of Minnesota *November 22 2014*
 Fun with Fibonacci, Math and Science Family Fun Fair, University of Minnesota *November 15 2013*
- **Volunteer**
- CSE Expo, MathCEP exhibit, University of Minnesota *Spring 2014*
- **Judge**
- Undergraduate Poster Symposium, University of Minnesota *April 16 2014*

COMPUTER LANGUAGES

Programs: MATLAB, Mathematica, AUTO,

Languages: L^AT_EX, Python

Operating Systems: UNIX, Windows