Timothy Roberts

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Education

- **Brown University** **Providence, RI**
  PhD , Applied Mathematics *Sept 2019 – May 2024*
  - Advisor: Bjorn Sandstede
  - Awarded: Larry S. Shu Prize in Applied Mathematics
  - Dissertation Title: *Homoclinic Snaking of Spatiotemporal Patterns in Reaction Diffusion Systems*
  - Coursework including: Nonlinear Dynamical Systems, Real and Functional Analysis, Numerical Analysis, Theory of Probability, Applications of Probability and Statistics, Graphs and Networks

- **University of Sydney** **Sydney, Aus**
  BSc. (Advanced Mathematics)(Honours), Honours Class I and the University Medal *2014–2017*
  - Awarded Joye Prize in Mathematics for earning the highest mark in the Honours Program
  - Honours in Applied Mathematics with supervisor Martin Wechselberger
  - Major in Mathematics

Employment

- **University of Chicago, Dept. of Statistics** **Chicago, IL**
  William H Kruskal Instructor *Aug 2024 - present*

Publications

[1] Kristen E. Harley, Peter van Heijster, Robert Marangell, Graeme J. Pettet, Timothy V. Roberts, and Martin Wechselberger. (In)stability of Travelling Waves in a Model of Haptotaxis. *SIAM Journal on Applied Mathematics*, 80(4):1629–1653, January 2020.

Presentations

Invited Talks

- **SIAM Dynamical Systems 2025** **Denver, CO**
  Radius Selection for Amphiphilic Structures
  - Minisymposium 70 – Spatial Localisation: A Global Perspective on Local Phenomena, Organized by Dan J Hill and Martina Chirilus-Bruckner.
- **Argonne National Lab - LANS Seminar** **Lemont, IL**
  Snaking Of 1-dimensional Spirals and Targets

- **Boston University Dynamics Seminar** **Boston, MA**
  Snaking Of Contact Defects
- **SIAM Dynamical Systems 2023** **Portland, OR**
  Snaking Of Contact Defects
  - Minisymposium 50 – Singular Perturbation Methods for Multi-Scale Infinite-Dimensional Systems, Organized by Samuel Jelbert and Jan-Eric Sulzbach.
- **BIRS Workshop "Topics in Multiple Timescale Dynamics" 2022** **Banff, CA**
  Snaking Of Contact Defects
- **Brown/BU/UMass Amherst Joint Dynamics and PDE Seminar** **Brown University**
  Snaking Of Contact Defects
- **SIAM Dynamical Systems 2021** **Virtual**
  Stability of Traveling Fronts by the Riccati-Evans Function
  - Minisymposium 100 – Wave and Front Dynamics: Propagation and Stability Organized by Paul Carter and Montie Avery
  - Awarded the SIAM Travel Award to fund my attendance
- **SIAM Dynamical Systems 2019** **Snowbird, UT**
  Using Geometry to Detect Stability: The Riccati-Evans Function
  - Minisymposium 158: Recent Developments in Dynamics of Localized Patterns Organized by Shin-Ichiro Ei, Takashi Teramoto and Peter van Heijster.
- **AustMS 2018** **Adelaide, Aus**
  (Un)Stable (non)physical waves in a model of tumour invasion
  - Special Session for Dynamical Systems and Ergodic Theory Organized by Cecilia Gonzalez-Tokman and Robert Marangell
  - Awarded the AustMS Student Support Scheme which funded my attendance
  - Awarded one of two Honorable Mentions for the Von Neumann Prize given to the best student talk

Contributed Talks

- **ANZIAM 2018** **Hobart, Aus**
  Neurons, temperature and timescales

Poster Presentations

- **MDDLS 2025 Conference at UCI Cellfate Institute** **Irvine, CA**
  Curvature and Confinement: Vegetation on Undulating Terrain
  - Awarded prize for best early career poster
- **Random Dynamical Systems with Applications to Biology, NITMB 2024** **Chicago, IL**
  Pattern Formation and Dynamical Systems

Conference and Workshop Attendance

- **MDDLS 2025 Conference at UCI Cellfate Institute**
  Irvine, CA
- **Random Dynamical Systems with Applications to Biology, NITMB 2024**
  Chicago, IL

- **Equadiff 2019**
  Leiden, NL
- **Slow-Fast-ival 2019**
  International Centre for Mathematical Sciences, University of Edinburgh
- **Sydney Dynamics Group Workshop 2018**
  Sydney, Aus

Research Experience

- **Graduate Student Researcher**
  Brown University *2020–2024*
  - Adviser: Bjorn Sandstede
  - Study the existence and stability of source defects in the Brusselator with particular focus on their arrangement into snaking bifurcations of 1-d targets and spirals.

- **Postgraduate Research Project**
  Sydney University *2018–2019*
  - Adviser: Robert Marangell
  - Developed and implemented a new numerical scheme for calculating the stability of 1-d fronts and pulses (the Riccati-Evans function) using geometric insights and applied this method to a cancer invasion model.
  - Results published in [1].

- **Honours Research Project**
  Sydney University *2017*
  - Adviser: Martin Wechselberger
  - Applied geometric singular perturbation theory (GSPT) to a model of single neuron activity in the mammalian brain to understand the mechanisms behind thermoregulation.

Teaching and Mentoring

Teaching Experience

- **Instructor**
  University of Chicago *2025-present*
  - CAAM31470 Applied Complex Analysis (Spring and Fall 2025)
  - MATH18600 Mathematics of Quantum Mechanics (Winter 2025)
- **Instructor**
  Brown University *2022*
  - APMA0350 Applied Ordinary Differential Equations (Summer 2022)
- **Graduate Teaching Assistant**
  Brown University *2020–2021*
  - APMA0650 Essential Statistics (Spring 2021)
  - APMA0360 Applied Partial Differential Equations I (Fall 2020)

- **Tutor (Grad TA Equivalent)**
  Sydney University *2017–2019*
  - MATH2921 Vector Calculus and Differential Equations (Advanced) (Sem 1 2019)
  - MATH3078/MATH3978 Partial Differential Equations and Waves (Normal/Advanced) (Sem 2 2018)
  - MATH1023 Multivariable Calculus and Modeling (Sem 2 2018)
  - MATH2921 Vector Calculus and Differential Equations (Advanced) (Sem 1 2018)
  - MATH1021 Calculus of One Variable (Sem 1 2018)
  - MATH1003 Integral Calculus (Sem 2 2017)
  - MATH1901 Differential Calculus (Advanced) (Sem 1 2017)

Qualifications and Training

- **Sheridan Course Design Seminar**
  Brown University *Spring 2022*
  - A semester long seminar for grad students and postdocs to learn the essential elements of course design. The seminar focuses on a backwards, student centered design philosophy with discussion of authentic learning outcomes, effective assessment design, active learning and writing pedagogy and syllabus design.
- **Sheridan Teaching Seminar - Reflective Teaching (Certificate 1)**
  Brown University *Fall 2020*
  - A semester long seminar designed to develop and refine basic teaching practices and evidence-based teaching skills and strategies. Particular focus is given to critical reflection, inclusivity, rhetorical practice, classroom communication, learning design and active learning strategies.

Mentoring Experience

- **Undergraduate and Masters Student Research mentor**
  University of Chicago *Fall 2024 - present*
  Joint with Mary Silber
- **Undergraduate REU Mentor**
  Brown University *Summer 2022*
  Joint with Bjorn Sandstede
- **Directed Reading Program**
  Brown University *Fall 2021-Spring 2024*
  - 3 students mentored
  - An extracurricular activity that match undergraduate students and graduate students with similar interests to participate in a reading project over the course of a semester. Graduate students are responsible for planning the project and mentoring their undergraduate counterpart, including weekly meetings and assistance producing a written proposal and talk.

Service

- **Co-organizer of the Computation and Modeling Seminar**
  University of Chicago *Fall 2024-present*
  - Responsible for seminar speaker organization and moderating feedback for graduate student speakers.
- **Graduate-Faculty Liaison for the Division of Applied Math**
  Brown University *Summer 2022-Spring 2024*
- **Society of Industrial and Applied Mathematics - Brown Chapter**
  President *Fall 2022-Spring 2024*

- Awarded 2021-2022 SIAM Brown Student Chapter certificate of recognition.
- Served as Vice-President in 2021.
- A community of students, postdocs and faculty interested in applied and interdisciplinary mathematics. We organize professional, academic and social events including latex tutorials, industry and internship panels, lightning talks, and competitions.

Brown Mathematical Competition for Modeling (BMCM)

Organizer *Fall 2021 - Spring 2024*

- The Brown Mathematics Contest for Modeling (BMCM) is a student competition where small groups of undergraduates attempt to answer open-ended, real world questions by analyzing data or constructing mathematical models.

SIAM Grad Seminar

Organizer *Fall 2021 - Spring 2024*

- The SIAM Grad Seminar is seminar series aimed at showcasing graduate research in Brown Applied Math in an informal setting. Each week a grad student gives a talk about their research or just some interesting mathematics. Audience feedback is also moderated by the organizers to provide an opportunity to learn presentation skills and practice conference talks.

Division of Applied Math Directed Reading Program (DRP)

Organizer *Spring 2021 - Spring 2024*

- Responsible for: the application process; matching undergraduates and graduates; organizing social events and final presentations; and, giving feedback for mentors and mentees.

Division of Applied Math Grad Student Retreat

Lead Organizer *Fall 2022*

- The Division of Applied Math has a tradition of taking the new incoming graduate cohort on a two day retreat. We provide students with the opportunity to make friends within their cohort and across the Division, learn about the Division and its research, and overall start their Brown experience with a bang.