

Department of Mathematics and Computer Science
Macalester College, 1600 Grand Ave.
St. Paul, MN 55105

ctopaz@macalester.edu
www.macalester.edu/~ctopaz
651-696-6380 (tel) 651-696-6518 (fax)

I. EDUCATION

- | | |
|---|-------------|
| Ph.D., Applied Mathematics
Northwestern University, Evanston, IL
<i>Dissertation: Pattern formation in two-frequency forced Faraday Waves</i>
<i>Advisor: Mary Silber</i> | 1998 - 2002 |
| M.S., Applied Mathematics
Northwestern University, Evanston, IL | 1996 - 1997 |
| A.B., Applied Mathematics
Harvard University, Cambridge, Massachusetts
<i>Cum laude honors</i>
<i>Area of application: biology</i> | 1992 - 1996 |

II. ACADEMIC APPOINTMENTS

Full-time appointments

- | | |
|--|----------------|
| Assistant Professor
Department of Mathematics and Computer Science
Macalester College, St. Paul, MN | 2007 - present |
| Assistant Professor
Rossier School of Education
University of Southern California, Los Angeles, CA | 2006 - 2007 |
| Assistant Director
Center for Excellence in Teaching
University of Southern California, Los Angeles, CA | 2006 - 2007 |
| NSF-VIGRE Assistant Professor
Department of Mathematics
University of California, Los Angeles, CA | 2003 - 2006 |
| NSF-VIGRE Postdoctoral Fellow
Department of Mathematics
Duke University, Durham, NC | 2002 - 2003 |

Visiting appointments**New Directions Research Professor**

2009 - 2010

Institute for Mathematics and its Applications
University of Minnesota, Minneapolis, Minnesota

Visiting Fellow

Spring 2006

Institute for Pure and Applied Mathematics
University of California, Los Angeles, CA

III. PUBLICATIONS

Articles published in peer-reviewed journals

10. A.J. Leverentz, C.M. Topaz, A.J. Bernoff. Asymptotic dynamics of attractive-repulsive swarms, *SIAM J. Appl. Dyn. Sys.* 8 (3) (2009) 880 - 908.
9. J.A. Higdón and C.M. Topaz. Blogs and wikis as instructional tools: A social software adaptation of just-in-time teaching, *College Teaching* 59 (2) (2009) 105 - 109.
8. C.M. Topaz, A.J. Bernoff, S. Logan and W. Toolson. A model for rolling swarms of locusts, *Euro. Phys. J. ST* 157 (1) (2008) 93 - 109.
7. C.M. Topaz, A.L. Bertozzi and M.A. Lewis. A nonlocal continuum model for biological aggregation, *Bull. Math Bio.* 68 (7) (2006) 1601 - 1623.
6. R. Breban, I. McGowan, C.M. Topaz, E. Schwartz, P. Anton and S. Blower. Modeling the potential impact of rectal microbicides to reduce HIV transmission in bathhouses. *Math. Biosci. Engin.* 3 (3) (2006) 459 - 466.
5. C.M. Topaz, J. Porter and M. Silber, Multi-frequency control of Faraday wave patterns, *Phys. Rev. E* 70 (6) (2004) 066206.1 - 066206.16.
4. J. Porter, C.M. Topaz and M. Silber, Pattern control via multi-frequency parametric forcing, *Phys. Rev. Lett.* 93 (3) (2004) 034502.1 - 034502.4.
3. C.M. Topaz and A.L. Bertozzi, Swarming patterns in a two-dimensional kinematic model for biological groups, *SIAM J. Appl. Math* 65 (1) (2004) 152 - 174.
2. C.M. Topaz and M. Silber, Resonances and superlattice pattern stabilization in two-frequency forced Faraday waves, *Physica D* 172 (1 - 4) (2002) 1 - 29.
1. M. Silber, C.M. Topaz and A.C. Skeldon, Two-frequency forced Faraday waves: Weakly damped modes and pattern selection, *Physica D* 143 (1 - 4) (2000) 205 - 225.

Articles published in peer-reviewed proceedings

1. B. Cook, D. Marthaler, C.M. Topaz, A.L. Bertozzi, M. Kemp, Fractional bandwidth reacquisition algorithms for VSW-MCM, in A.C. Schultz, L.E. Parker, F.E. Schneider (Eds.), *Multi-Robot Systems: From Swarms to Intelligent Automata*, Vol. 2, (2003) 77 - 86.

Book reviews

1. C.M. Topaz. Review of Continuum Modeling in the Physical Sciences by van Groesen and Molenaar, *Biometrics* 64 (2008) 1299 - 1300.

Articles submitted to peer-reviewed journals

1. C.M. Topaz and A.J. Catllà. Forced patterns near a Turing-Hopf bifurcation, in review for publication in *Phys. Rev. Lett.* (2009) 1 - 10.

Completed articles ready for submission

1. G. Goetzke, V. Addona, C.M. Topaz. Tuberculosis screening for international students at a Midwestern liberal arts college (2009) 1 - 12.

Articles in preparation for submission to peer-reviewed journals

1. A.J. Bernoff and C.M. Topaz. Equilibrium configurations of interacting particles.

IV. PRESENTATIONS

Invited research seminars at colleges and universities

- | | |
|---|-----------|
| 31. TBD
University of St. Thomas, Center for Applied Mathematics | Nov. 2009 |
| 30. Biological aggregation patterns: The role of social interactions
University of British Columbia, Dept. of Mathematics | Oct. 2009 |
| 29. Biological aggregations and their mathematical models
Hamline University, Dept. of Biology | Oct. 2009 |
| 28. Biological aggregation patterns: The role of social interactions
Georgia Institute of Technology, School of Mathematics | Sep. 2009 |
| 27. Patterns in nature
Macalester College, Serie Center for Scholarship and Teaching | Oct. 2008 |
| 26. Biological aggregation patterns: The role of social interactions
University of Wisconsin at Madison, Department of Mathematics | Sep. 2008 |
| 25. Biological aggregations and their mathematical models
Macalester College, Department of Biology | Nov. 2007 |
| 24. Social biological organisms: Aggregation patterns and dynamics
Drexel University, Department of Mathematics | Feb. 2007 |
| 23. Biological swarms as pattern-forming dynamical systems
Amherst College, Department of Mathematics and Computer Science | Feb. 2007 |

22. Social biological organisms: Aggregation patterns and dynamics
Macalester College, Department of Mathematics and Computer Science Feb. 2007
21. Social biological organisms: Aggregation patterns and dynamics
College of William and Mary, Department of Mathematics Feb. 2007
20. Social biological organisms: Aggregation patterns and dynamics
University of Delaware, Department of Mathematical Sciences Jan. 2007
19. Social biological organisms: Aggregation patterns and dynamics
Claremont Graduate University, School of Mathematical Sciences Dec. 2006
18. Biological swarms and their mathematical models
Kenyon College, Department of Mathematics Nov. 2006
17. Social biological organisms: Aggregation patterns and dynamics
University of Southern California, Dept. of Aerospace and Mechanical Engineering Oct. 2006
16. Biological swarms and their mathematical models
Bowdoin College, Department of Mathematics Jan. 2006
15. Social biological organisms: Aggregation patterns and dynamics
Southern Methodist University, Department of Mathematics Jan. 2006
14. Social biological organisms: Aggregation patterns and dynamics
University of Pittsburgh, Department of Mathematics Jan. 2006
13. Social biological organisms: Aggregation patterns and dynamics
State University of New York at Buffalo, Department of Mathematics Dec. 2005
12. Social biological organisms: Aggregation patterns and dynamics
University of Southern California, Department of Mathematics Nov. 2005
11. Social biological organisms: Aggregation patterns and dynamics
University of California at Los Angeles, Department of Mathematics Mar. 2005
10. Biological swarms and their mathematical models
Occidental College, Department of Mathematics Feb. 2005
9. Social biological organisms: Aggregation patterns and dynamics
Northwestern University, Program on Complex Systems Feb. 2005
8. Swarming dynamics in biological groups
University of Ontario Institute of Technology, Faculty of Science Mar. 2004
7. Dynamics of a two-dimensional continuum model for swarming
North Carolina State University, Department of Mathematics Apr. 2003
6. Dynamics of a two-dimensional continuum model for swarming
University of British Columbia, Department of Mathematics Apr. 2003
5. A gentle introduction to pattern formation in spatially extended systems
Duke University, Department of Mathematics Oct. 2002

4. Pattern formation in Faraday waves forced with two and more frequencies
Duke University, Center for Nonlinear and Complex Systems Oct. 2002
3. Dynamics and pattern formation for the non-specialist
Harvey Mudd College, Department of Mathematics Feb. 2002
2. Dynamics and pattern formation for the non-specialist
Olin College of Science and Engineering Jan. 2002
1. Resonances and superlattices in two-frequency-forced Faraday waves
Massachusetts Institute of Technology, Department of Mathematics Dec. 2001

Invited research presentations at conferences and workshops

7. Biological aggregation patterns: The role of social interactions
Creating Case-Based Curricula at the Intersection of Biology and Mathematics
Emory University, Atlanta, Georgia Jul. 2009
6. A model for rolling migratory locust swarms
Minisymposium on Biological Motion, Canada-France Mathematics Congress
University of Quebec, Montreal, Canada Jun. 2008
5. Biological patterns and localization
Conference on Active Motion and Swarms
Humboldt University, Berlin, Germany Dec. 2006
4. Social biological organisms: Aggregation patterns and localization
Workshop on Swarming by Nature and Design
Institute for Pure and Applied Mathematics, UCLA, Los Angeles, California Mar. 2006
3. Social biological organisms: Aggregation patterns and dynamics
Gordon Research Conference on Nonlinear Science
Colby College, Waterville, Maine Jun. 2005
2. Swarming patterns in a two-dimensional kinematic model for biological groups
Minisymposium on Biological Agents, American Physical Society March Meeting
Montreal, Canada Mar. 2004
1. Faraday wave pattern selection via multi-frequency forcing
Conference on Patterns in Physics
Fields Institute, University of Toronto, Toronto, Canada Nov. 2003

Contributed research presentations at national or international conferences

10. Asymptotic dynamics of attractive-repulsive swarms
Annual Meeting, Society for Industrial and Applied Mathematics
San Diego, California Jul. 2008
9. On the swarming of locusts
Dynamical Systems Meeting, Society for Industrial and Applied Mathematics
Snowbird, Utah May 2007

8. A nonlocal continuum model for biological aggregation
Dynamical Systems Meeting, Society for Industrial and Applied Mathematics
Snowbird, Utah May 2005
7. A nonlocal continuum model for localized biological aggregations
Dynamics Days Conference
Long Beach, California Jan. 2005
6. Dynamics of a two-dimensional continuum model for swarming
Dynamical Systems Meeting, Society for Industrial and Applied Mathematics
Snowbird, Utah May 2003
5. Pattern selection of Faraday waves forced with two frequencies
Dynamical Systems Meeting, Society for Industrial and Applied Mathematics
Snowbird, Utah May 2001
4. Pattern selection of two-frequency forced Faraday waves
Division of Fluid Dynamics Conference, American Physical Society
Washington, District of Columbia Nov. 2000
3. Pattern selection of two-frequency forced Faraday waves
International Congress of Theoretical and Applied Mechanics
Chicago, Illinois Sep. 2000
2. Faraday wave pattern selection in the presence of competing instabilities
APS Division of Fluid Dynamics Conference
New Orleans, Louisiana Nov. 1999
1. Faraday waves: Normal form symmetries and pattern selection
Dynamical Systems Meeting, Society for Industrial and Applied Mathematics
Snowbird, Utah May 1999

Presentations on teaching

4. Clickers in the classroom: Assessing real-time learning
Collaborative Assessment for Liberal Learning Consortium
Wrap-up Conference, St. Olaf College Apr. 2009
3. Clickers in the classroom: Assessing real-time learning
Talking About Teaching Series
Serie Center for Scholarship and Teaching, Macalester College Feb. 2009
2. Blogging for teaching and learning
Talking About Teaching Series
Serie Center for Scholarship and Teaching, Macalester College Apr. 2008
1. Blogging for teaching and learning
Learner-Centered Teaching Seminar Series
Center for Excellence in Teaching, University of Southern California Apr. 2007

V. GRANTS, AWARDS AND RECOGNITION

External grants

National Science Foundation Undergraduate Biology/Mathematics program Quantitative Biology: Education/Research Training (QBERT) at Macalester College Co-principal investigator, \$634,835 institutional grant	Under review
National Science Foundation DMS-0639749/0740484 Modeling and control of pattern-forming dynamical systems Principal investigator, \$209,679 single-investigator grant	2006 - 2010
National Science Foundation DMS-0802959 CSUMS: A Computational Training and Interdisciplinary Research Program Contributing research personnel, \$716,836 grant (through Univ. of St. Thomas)	2008 - 2013

Awards and fellowships

New Directions Research Professorship, IMA, University of Minnesota	2009 - 2010
Henderson Dissertation Year Fellowship, Northwestern University	2001 - 2002
NSF-IGERT Graduate Training Fellowship, Northwestern University	2000 - 2002
Royal E. Cabell Graduate Fellowship	1996 - 1997

Teaching honors

Assistant Director, Center for Excellence in Teaching University of Southern California	2006 - 2007
Nominee, Copenhaver Award for Teaching with Technology University of California at Los Angeles	2006
Winner, Robert Sorgenfrey Distinguished Teaching Award Department of Mathematics, University of California at Los Angeles	2004
Nominee, Distinguished Alumni Undergraduate Teaching Award Duke University	2003
Fellow, Searle Center for Teaching Excellence Northwestern University	2000 - 2001

VI. TEACHING EXPERIENCE

Continuous Applied Mathematics 437	Macalester College	Spring semester 2009
Applied Calculus 135 (2 sections)	Macalester College	Fall semester 2008
Differential Equations 312	Macalester College	Fall semester 2008
Applied Calculus 135	Macalester College	Spring semester 2008
Scientific Computation 365	Macalester College	Spring semester 2008
Applied Calculus 135	Macalester College	Fall semester 2007

Mathematical Modeling 432	Macalester College	Fall semester 2007
Applied Numerical Methods I 151A	UCLA	Winter quarter 2006
Nonlinear Dynamical Systems 134	UCLA	Fall quarter 2005
Applied Numerical Methods I 151A	UCLA	Spring quarter 2005
Nonlinear Dynamical Systems 135A	UCLA	Winter quarter 2005
Applied Numerical Methods I 151A	UCLA	Fall quarter 2004
Applied Numerical Methods I 151A	UCLA	Spring quarter 2004
Applied Numerical Methods II 151B	UCLA	Winter quarter 2004
Applied Numerical Methods I 151A	UCLA	Fall quarter 2003
Partial Differential Equations 133	Duke University	Spring semester 2003
Applied Mathematical Analysis II 114	Duke University	Fall semester 2002
Review of Calculus of One Variable 213 (TA)	Northwestern University	Fall quarter 1999
Review of Calculus of One Variable 213 (TA)	Northwestern University	Fall quarter 1998

VII. ADVISING AND SUPERVISION

Capstone / thesis advisor

Andrew Johnson B.A. in mathematics and economics, Macalester College, 2009 Modeling the movement of the pea aphid, <i>Acyrtosiphon pisum</i>	2008 - 2009
Stephanie Abascal B.A. in mathematics and biology, Macalester College, 2008 Pharmacokinetics of Bisphenol-A	2007 - 2008
Innocent Dlamini B.A. in mathematics and physics, Macalester College, 2008 Interventions for the HIV epidemic in Swaziland Received prize for best capstone presentation	2007 - 2008
Christopher Dragga (Konhauser Award in computer science) B.A. in mathematics and computer science with honors, Macalester College, 2008 Ad-hoc mobile computer networks	2007 - 2008
Sarah Sutter (Ezra Camp award in mathematics) B.A. in mathematics, music and Russian, Macalester College, 2008 Chaotic generation of musical variations	2007 - 2008
Andrew Leverentz (Busenberg Prize in Applied Mathematics) B.S. in mathematics, Harvey Mudd College, 2008 Asymptotic dynamics of attractive-repulsive swarms Received an MAA "Best Poster" prize at 2008 Joint Math Meetings	2007 - 2008

Ryan Letchworth B.S. in math/physics/electrical engineering, Duke University, 2004 Numerical wavelet methods for PDE Received highest honors for thesis	2003 - 2004
<u>Summer research advisor</u>	
Amelia McNamara B.A. in applied mathematics and English, Macalester College, expected 2010 Control of Turing patterns	2009
Joe Novak B.A. in mathematics, Macalester College, 2009 Semiochemical-mediated aphid-ant interactions	2009
Manan Gupta B.A. in chemistry and computer science, Wofford College, expected 2010 Turing pattern formation in the CDIMA chemical reaction	2009
Chris Wulf B.A. in chemistry, Wofford College, expected 2010 Turing pattern formation in the CDIMA chemical reaction	2009
Grace Goetzke B.A. in biology, Macalester College, expected 2010 Tuberculosis screening for international students at Macalester College	2008
Andy Johnson B.A. in mathematics and economics, Macalester College, expected 2009 Congregation and aggregation behavior of pea aphids	2008
Emily Merrill B.A. in mathematics, Macalester College, expected 2010 Control of Turing patterns via external forcing	2008
Zach Wickens B.A. in chemistry and mathematics, Macalester College, expected 2010 Control of Turing patterns via external forcing	2008
Wyatt Toolson B.S. in mathematics, Harvey Mudd College, 2007 Models of rolling locust swarms	2005
Sheldon Logan B.S. in engineering, Harvey Mudd College, 2006 Models of rolling locust swarms	2005
Catherine Beni (National Physical Sciences Consortium Graduate Fellow) B.S. summa cum laude in mathematics, UCLA, 2005 Network models of epidemics	2004

Ben Cook 2002
 B.S. in mathematics and physics, Duke University, 2003
 Cooperative search strategies for underwater autonomous vehicles

Independent study / research supervisor

Allison Harris 2009
 B.A. in chemistry, Macalester College, expected 2010
 Constructing a reactor for the pattern-forming CDIMA chemical reaction

Amelia McNamara 2009
 B.A. in mathematics and English, Macalester College, expected 2010
 Turing pattern formation

Stephanie Abascal 2008
 B.A. in mathematics and biology, Macalester College, 2008
 Nonlinear dynamical systems

Zack Permutt 2005
 B.S. in mathematics, UCLA, 2006
 Control of Turing pattern formation

Saroj Srisai 2000
 B.S. in applied mathematics, Northwestern University, 2001
 Impulsively forced Faraday waves

Honors thesis committee member (Macalester College)

Christopher Dragga (computer science) 2007 - 2008
 B.A. in computer science and mathematics, Macalester College, 2008
 Implementing Bluetooth Support in Wifi-Based Mobile Ad-Hoc Networks
 Advisor: Libby Shoop

Capstone project second reader (Macalester College)

Emily Gras 2007 - 2008
 B.A. in mathematics and physics, Macalester College, 2008
 Models of Traffic Flow
 Advisor: Daniel Flath

Nisse Greenberg 2007 - 2008
 B.A. in mathematics, Macalester College, 2008
 Using Expectation Maximization to Separate Data into Groups
 Advisor: Danny Kaplan

Internship Supervisor (Macalester College)

Innocent Dlamini 2008
 B.A. in mathematics and physics, Macalester College, 2008
 Tutoring middle school students in mathematics

VIII. SERVICE

Service to profession

Ad-hoc referee for American Mathematical Monthly, BMC Public Health, Bulletin of Mathematical Biology, Discrete and Continuous Dynamical Systems, Journal of the Acoustical Society of America, Journal of Mathematical Biology, Journal of Nonlinear Science, Journal of Statistical Physics, Journal of Theoretical Biology, Mathematics Reviews, Physica A, Physica D, Physical Review E, Physical Review Letters, SIAM Journal on Applied Dynamical Systems Ongoing

Co-Organizer, Workshop: Insect Self-Organization and Swarming Mathematical Biosciences Institute, Ohio State University 2011

Contributing Editor, DSWeb Magazine Society for Industrial and Applied Mathematics 2007 - present

Co-Organizer, Undergraduate Research Poster Session Society for Industrial and Applied Mathematics Annual Meeting Jul. 2009

Co-Organizer, Minisymposium: Forced chemical patterns SIAM Conference on Applications of Dynamical Systems May 2009

Co-Organizer, Minisymposium: Undergraduate Research in Dynamical Systems Society for Industrial and Applied Mathematics Annual Meeting Jul. 2008

Co-Organizer, Undergraduate Research Poster Session Society for Industrial and Applied Mathematics Annual Meeting Jul. 2008

Co-Organizer, Minisymposium: Individual and Collective Motion in Biology SIAM Conference on Applications of Dynamical Systems May 2007

Co-Organizer, Minisymposium: Models of Biological Swarms SIAM Conference on Applications of Dynamical Systems May 2005

Co-Organizer, Interdisciplinary Workshop: Biological and Artificial Swarms Institute for Pure and Applied Mathematics, University of California at Los Angeles Oct. 2003

Co-Organizer, Minisymposium: Swarming in Biological and Multi-Agent Systems SIAM Conference on Applications of Dynamical Systems May 2003

Past Chair, Chair, Chair-Elect, Forum on Graduate Student Affairs American Physical Society 2000 - 2003

Service to college / university

Member, Scholarly Publishing Advisory Committee Macalester College 2008 - present

Member, Advisory Board Serie Center for Scholarship and Teaching, Macalester College 2008 - present

<i>Volunteer interviewer/scribe</i> , Midterm Course Interview Program Serie Center for Scholarship and Teaching, Macalester College	2008 - present
<i>Volunteer</i> , Allies Program Lealtad-Suzuki Center, Macalester College	2008 - present
<i>Member</i> , Teaching Partners Program Center for Scholarship and Teaching, Macalester College	2008
<i>Member</i> , Institutional Animal Care and Use Committee Macalester College	2007 - present
<i>Mentor</i> , LGBT Mentoring Program University of California at Los Angeles	2004 - 2006
<i>Member</i> , LGBT Resource Center Advisory Board University of California at Los Angeles	2003 - 2006
<u>Service to department</u>	
<i>Member</i> , Statistics Search Committee Macalester College, Department of Mathematics and Computer Science	2009
<i>Organizer</i> , Departmental Seminar Macalester College, Department of Mathematics and Computer Science	2008 - 2009
<i>Liaison</i> , 3/2 Engineering Program Macalester College, Department of Mathematics and Computer Science	2008 - present
<i>Coordinator</i> , Departmental Podcast Initiative Macalester College, Department of Mathematics and Computer Science	2007 - present
<i>Volunteer Speaker</i> , Pi Mu Epsilon Honor Society University of California at Los Angeles, Department of Mathematics	Winter 2005
<i>Member</i> , Differential Equations Curriculum Subcommittee University of California at Los Angeles, Department of Mathematics	2004

IX. MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Mathematical Society (AMS)
 Mathematical Association of America (MAA)
 Society for Industrial and Applied Mathematics (SIAM)
 Society for Mathematical Biology (SMB)