

ANDREW JOEL BERNOFF

Department of Mathematics
Harvey Mudd College
301 Platt Blvd.
Claremont, CA 91711

E-mail: ajb@hmc.edu
WWW: <http://www.math.hmc.edu/~ajb>
Phone: (909) 621-8687

RESEARCH INTERESTS

- Fluid Mechanics
- Microfluidics
- Swarming and Biological Aggregation
- Pattern Formation
- Dynamical Systems, Bifurcations & Stability
- Thin Films & Lubrication Theory
- Free Boundary Problems & Intrinsic Coordinates
- Self-similarity & Singularity Formation

EDUCATION

University of Cambridge (Trinity College)
PhD in Applied Mathematics, 1988

Massachusetts Institute of Technology
BS in Applied Math, 1982
BS in Physics, 1982

EMPLOYMENT

2009– Chair of Mathematics
Diana & Kenneth Jonsson Professor of Mathematics, **Harvey Mudd College**

2008–2009 Visiting Faculty, **New York University**
Courant Institute of Mathematical Sciences

2007–2008 Director, Mathematics Clinic Program, **Harvey Mudd College**
Department of Mathematics

Spring 2004 Visiting Faculty, **University of California, Berkeley**
Department of Mechanical Engineering

Spring 2002 Visiting Faculty, **Duke University**
Department of Mathematics

2001–Present Professor of Mathematics, **Harvey Mudd College**

1998–2001 Associate Professor of Mathematics, **Harvey Mudd College**

Spring 1998 Visiting Scientist, **University of British Columbia**
Department of Mathematics

Fall 1997 Visiting Faculty, **Duke University**
Department of Mathematics

Fall 1996 Member, **Mathematical Sciences Research Institute**
University of California, Berkeley

1990–1997 Assistant Professor, **Northwestern University**
Department of Engineering Sciences & Applied Mathematics

1989–1990 NSF Postdoctoral Fellow, **University of California, Berkeley**
Department of Mathematics (with Professor John Neu)

1989–1990 Member, **Mathematical Sciences Research Institute**
University of California, Berkeley

1986–1989 Research Associate, **University of Arizona**
Mathematics Department

HONORS AND AWARDS

- 2009 Appointed Diana & Kenneth Jonsson Professor of Mathematics (Endowed Chair)
- 2005 AMS Award for Exemplary Program or Achievement in a Mathematics Department
Awarded to the Harvey Mudd College Mathematics Department
- 1995–1996 Northwestern University Student Government Honor Roll
Recognized for Excellence in Teaching
- 1989–1991 NSF Mathematical Sciences Postdoctoral Fellowship
For postgraduate study in Mathematics at the University of California, Berkeley
- 1982–1985 Marshall Scholarship
For graduate study at the University of Cambridge
- 1978 Represented USA in the International Mathematics Olympiad

PROFESSIONAL APPOINTMENTS

- 2007, 2010 Member, NSF Committee of Visitors
Invited to assess and critique the Directorate of Mathematical Sciences at NSF.
- 2009 - 2011 Executive Committee, Claremont Center for Mathematical Sciences
- 2009 - Chair, Harvey Mudd College Department of Mathematics
- 2007 - 2008 Director, Harvey Mudd College Mathematics Clinic
Recruited, staffed and administered industrial-sponsored student research teams.
- 2008 -2011 Steering Committee, Park City Math Institute
Recruit and select lecturers, researchers and students for three-week summer school.
- 2007- Associate Editor, SIAM Undergraduate Research Online (SIURO)
Member of the inaugural editorial board for SIAM's undergraduate research publication
- 2005-2010 Section Editor, SIAM Review Education Section
Director of editorial board for the Education Section of SIAM Review.
- 2001-2004 Associate Editor, SIAM Review Education Section
- 2010-2011 Associate Editor, SIAM Review Education Section
- 2004-2011 President, Southern California Section of SIAM

PROFESSIONAL ACTIVITIES

- Member, Society of Industrial & Applied Mathematics
- Member, American Physical Society
- Reviewer, National Science Foundation
- Referee, European Journal of Applied Mathematics
- Referee, Journal of Fluid Mechanics
- Referee, Physica D
- Referee, Physics of Fluids
- Referee, Physical Review Letters
- Referee, SIAM Journal of Applied Mathematics
- Referee, SIAM Review
- Grader, William Lowell Putnam Mathematics Competition

HMC ADVISING & COMMITTEES (Selected since 2000)

2009-	Department Chairs Committee
2007-2008	Mathematics Thesis Coordinator
2007-2008	Chair, Fellowships Committee
2007-2008	Chair, Library Committee
2006-2007	Co-Chair, HMC Strategic Planning Committee <i>Optimizing the HMC Experience</i>
2006-2007	Chair, Mathematics Postdoctoral Fellowship Search Committee
2006-2007	Associate Chair, Mathematics Department
2006-2007	Mathematics Thesis Coordinator
2005-2006	Chair, Presentations Day Organizing Committee
2005-2006	Chair, Mathematics Search Committee
2005-2007	Chair, Fellowships Committee
2003-2007	Institutional Representative for Rhodes, Marshall and Churchill Scholarships
2003-2004	Chair, Committee on Campus Life
Fall 2003	Chair, Reappointments, Promotion & Tenure Committee
2002-2003	Reappointments, Promotion & Tenure Committee
2002-2003	Chair, Mathematics Junior Search Committee
2002-2003	Mathematics Thesis Coordinator
2002-2003	Presentations Day Organizing Committee
2000-2001	Co-chair, Presentations Day Organizing Committee
2000-2002	Diversity Committee
2000-2002	Watson Fellowship Selection Committee
1999-Present	Mathematics Undergraduate Adviser

UNDERGRADUATE RESEARCH STUDENTS

Louis Ryan, HMC 2012

Senior Thesis, Fall 2011-Spring 2012

Project: *Analysis of Swarm Behavior in Two Dimensions*

Undergraduate Research, Summer 2011

Project: *Modelling the Interaction of Swarming Predators and Prey*

Research at Macalester College supervised jointly with Chad Topaz.

Dylan Marriner, HMC 2013

Undergraduate Research, Summer 2011

Project: *Modelling the Interaction of Swarming Predators and Prey*

Research at Macalester College supervised jointly with Chad Topaz.

Undergraduate Research, Summer 2010

Project: *Analysis of Microfluidic Mixing in a Drop*

Supported by the Fletcher-Jones Foundation.

Andrew Ronan, HMC 2011

Senior Thesis, Fall 2010-Spring 2011

Project: *Dynamics of Attractive-Repulsive Swarms*

Cecily Keppel, HMC 2011

Senior Thesis, Fall 2010-Spring 2011

Project: *Analysis of Mixing in a 2D Drop due to Time-Dependent Boundary Stresses*

Undergraduate Research, Summer 2010

Project: *Analysis of Microfluidic Mixing in a Drop*
Supported by the Fletcher-Jones Foundation.

Undergraduate Research, Fall 2009

Project: *Dipole Forces in Langmuir Layers*

Michael Davis, Claremont Graduate University

Research Project, Summer 2010

Project: *Analysis of Microfluidic Mixing in a Drop*
Supported by the Fletcher-Jones Foundation.

Amanda Clemm, Scripps College 2013

Undergraduate Research, Summer 2010

Project: *Analysis of Microfluidic Mixing in a Drop*
Supported by the Fletcher-Jones Foundation.

Andrew Leverentz, HMC 2008

Senior Thesis, Fall 2007-Spring 2008

Undergraduate Research, Summer 2007

Project: *An Integrodifferential Equation Modeling 1-D Swarming Behavior*
Jointly Supervised with Prof. C. Topaz (Macalester College)

George Tucker, HMC 2008

Senior Thesis, Fall 2007-Spring 2008

Project: *Domain Relaxation in Langmuir Films with Dipole-Dipole Repulsion*

Kazh Brito, HMC 2007

Senior Thesis, Fall 2006-Spring 2007

Project: *Hole Closure in Langmuir Fluid Monolayers*

Joseph Majkut, HMC 2006

Senior Thesis, Fall 2005-Spring 2006

Project: *Foraging Fruit Flies: Lagrangian and Eulerian Descriptions of Insect Swarming*

Benjamin Azose, HMC 2006

Undergraduate Research, Summer 2005

Project: *Dynamics of Image Snakes*
Jointly Supervised with Prof. A.L. Bertozzi (UCLA)

Sheldon Logan, HMC 2006

Undergraduate Research, Summer 2005

Project: *Simulation and Analysis of Biological Aggregations*
Jointly Supervised with Prof. C. Topaz (UCLA)

Wyatt Toolson, HMC 2006

Undergraduate Research, Summer 2006

Undergraduate Research, Summer 2005

Project: *Simulation and Analysis of Biological Aggregations*
Jointly Supervised with Prof. C. Topaz (UCLA)

Jacob Pugh, HMC 2006

Research project, Summer 2006

Senior Thesis, Fall 2005-Spring 2006

Undergraduate Research, Summer 2005

Project: *Dynamics of Tethers in Langmuir Layers*

Robin Baur, HMC 2006

Senior Thesis, Spring 2004-Fall 2005

Undergraduate Research, Summer 2004

Project: *Rupture in Thin Fluid Films*

Dan Beutel, HMC 2003

Senior Thesis, Fall 2002-Spring 2003

Project: *Modeling Advection and Diffusion in Microchannels*

Benjamin Bryant, HMC 2003

Senior Thesis, Fall 2002-Spring 2003

Project: *Modeling Moving Droplets: A Precursor Film Approach*

Dmitriy Kogan, HMC 2003

Undergraduate Research, Summer 2002-Spring 2003

Project: *Pattern Formation in Diblock Copolymers*

Jointly Supervised with Prof. A.E.Hosoi

Michael Gratton, HMC 2002

Senior Thesis, Fall 2001-Spring 2002

Project: *The Effects of Torsion on Anomalous Diffusion in Helical Pipes*

Awarded the Chavin Prize for Best Senior Thesis

Bradley Forrest, HMC 2002

Senior Thesis, Fall 2001-Spring 2002

Project: *Modeling Faraday Excitation of a Viscous Fluid*

Marco Latini, HMC 2001

Senior Thesis, Fall 2000-Spring 2001

Project: *Mixing in Curved Pipes*

Undergraduate Research, Spring 1999 - Fall 2000

Project: *Transient Anomalous Diffusion in Models of Mixing in Shear Flows*

Anand Patil, HMC 2001

Senior Thesis, Fall 2000-Spring 2001

Project: *Modeling Van-der-Waals Driven Droplet Formation in Thin Films*

Awarded the Chavin Prize for Best Senior Thesis

Bryan Tysinger, HMC 2001

Undergraduate Research, Summer 2000

Project: *Self-similarity in ODE Models*

Joel Miller, HMC 2000

Senior Thesis, Fall 1999-Spring 2000

Project: *Self-Similar Decay of Localized Diffusive Waves*

W. Douglas Wilson, Northwestern University 1998

NSF Research Experience for Undergraduates, Summer 1995

Project: *Self-Similarity in Models of Solidification*

Other HMC Students I have jointly supervised: Andrew Higginbotham (HMC 2009), Andrew Mugler (HMC 2004), Natalie Schommer (HMC 2004), Jason Hogan (HMC 2003), Michael Schubmehl (HMC 2002) all of whom have worked in Prof. Donnelly's research group.

GRADUATE & POSTDOCTORAL RESEARCH STUDENTS

Graduate

- David Sarocka, Ph.D. June 1996 Northwestern University
Thesis: *Intrinsic Equations of Motion and Long-Wave Models of Solidification*
Present Position: Assistant Professor, University of Wisconsin, Whitewater
- Joseph Lingeitch, Ph.D. June 1995 Northwestern University
Thesis: *Shear-diffusion Mixing of Passive Scalars and Vorticity in Monopoles and Dipoles*
Present Position: Research Scientist, Naval Research Laboratory
- J. H. M. van Dongen, M.S. in Mechanical Engineering, 1994 Northwestern University
Thesis: *A Two-Dimensional Numerical Exposition of a Vortex Line in a Turbulent Boundary Layer*
(supervised jointly with Prof. Seth Lichter)
Present Position: Shell Oil, The Netherlands

Postdoctoral

- Dr. Louis Rossi, NSF Mathematical Sciences Postdoctoral Research Fellowship,
July 1994–August 1996 Northwestern University
Project: *Investigation of Vortex Monopole and Dipole Interactions*
Present Position: Assistant Professor, University of Delaware

PUBLICATIONS

Publications in Refereed Journals

1. W. Arter, A. Bernoff & A. C. Newell, "Wavenumber Selection of Convection Rolls in a Box," **Phys. Fluids** 30 (1987) 3840-3842.
2. A. J. Bernoff, "Slowly Varying Fully Nonlinear Wavetrains in the Ginzburg-Landau Equation," **Physica D** 30 (1988) 363-381.
3. S. Lichter & A. J. Bernoff, "Stability of Steady Cross-waves: Theory and Experiment," **Phys. Rev. A** 37 (1988) 1663-1667.
4. A. J. Bernoff & S. Lichter, "A Continuum Model of Thin Film Deposition," **Phys. Rev. B** 39 (1989) 10560-10569.
5. A. J. Bernoff, L. P. Kwok & S. Lichter, "Viscous Cross-waves: An Analytical Treatment," **Phys. Fluids A** 1 (1989) 678-688.
6. H. Ayanle, A. J. Bernoff & S. Lichter, "Spanwise Modal Competition in Cross-waves," **Physica D** 43 (1990) 87-104.
7. A. J. Bernoff, "Spiral Waves Solutions for Reaction-Diffusion Equations in a Fast Reaction/Slow Diffusion Limit," **Physica D** 53 (1991) 125-150.
8. W. B. Underhill, S. Lichter & A. J. Bernoff, "Modulated, Frequency Locked and Chaotic Cross-waves," **J. Fluid Mech.** 225 (1991) 371-394.
9. A. J. Bernoff, "Finite Amplitude Convection Between Stress-free Boundaries: Ginzburg-Landau Equations and Modulation Theory," **Euro. J. Appl. Math.** 5 (1994) 267-282.
10. J. F. Lingeitch & A. J. Bernoff, "Advection of a Passive Scalar by a Vortex Couple in the Small-diffusion Limit," **J. Fluid Mech.** 270 (1994) 219-250.
11. A. J. Bernoff & J. F. Lingeitch, "Rapid Relaxation of an Axisymmetric Vortex," **Phys. Fluids** 6 (1994) 3717-3723.
12. A. J. Bernoff, R. Kuske, B. J. Matkowsky & V. Volpert, "Mean Field Effects for Counterpropagating Traveling Wave Solutions of Reaction-Diffusion Systems," **SIAM J. Appl. Math.** 55 (1995) 485-519.
13. J. F. Lingeitch & A. J. Bernoff, "Distortion and Evolution of a Localized Vortex in an Irrotational Flow," **Phys. Fluids.** 7 (1995) 1015-1026.
14. D. C. Sarocka & A. J. Bernoff, "An Intrinsic Equation of Interfacial Motion for the Solidification of a Pure Hypercooled Melt," **Physica D** 85 (1995) 348-374.
15. A. J. Bernoff & A. L. Bertozzi, "Singularities in a Modified Kuramoto-Sivashinsky Equation Describing Interface Motion for Phase Transition," **Physica D** 85 (1995) 375-404.
16. A. J. Bernoff, H. J. H. M. van Dongen & S. Lichter, "The Steady Boundary Layer due to a Fast Vortex," **Phys. Fluids** (1996) 156-162.

17. O. V. Atassi, S. Lichter & A. J. Bernoff, "The Interaction of a Point Vortex with a Boundary Layer Leading to Eruption," **AIAA** 96-2140 (1996).
18. O. V. Atassi, A. J. Bernoff & S. Lichter, "The Interaction of a Point Vortex and a Wall-Bounded Vortex Layer," **J. Fluid Mech.** 343 (1997) 169-195.
19. L. F. Rossi, J. F. Lingeitch & A. J. Bernoff, "Quasi-steady Monopole and Tripole Attractors in Relaxing Vortices," **Phys. Fluids** 9 (1997) 2329-2338.
20. A. J. Bernoff & P. Sternberg, "Onset of Superconductivity in Decreasing Fields for General Domains," **J. Math Phys.** 39 (1998) 1272-1284.
21. T. P. Witelski & A. J. Bernoff, "Self-similar Asymptotics and for Linear and Nonlinear Diffusion Equations," **Stud. Appl. Math.** 100 (1998) 153-193.
22. O. V. Atassi, A. J. Bernoff, & S. Lichter, "Interacting Vortex and Vortex Layer: How Length Scale Affects Entrainment and Ejection," **AIAA J.** 36 (1998) 924-928.
23. A. J. Bernoff, A. L. Bertozzi & T. P. Witelski, "Dynamics and Stability of Self-similar Pinch-off via Surface Diffusion," **J. Stat. Phys.** 93 (1998) 725-776.
24. D. C. Sarocka, A. J. Bernoff & L. F. Rossi, "Large-amplitude Solutions to the Sivashinsky and Riley-Davis Equations for Directional Solidification," **Physica D** 127 (1999) 146-176.
25. T. P. Witelski & A. J. Bernoff, "Stability of Self-similar Solutions for Van der Waals Driven Thin Film Rupture," **Phys. Fluids** 9 (1999) 2443-2445.
26. T.P. Witelski & A. J. Bernoff, "Dynamics of Three-dimensional Thin Film Rupture," **Physica D** 147 (2000) 155-176.
27. M. Latini* & A. J. Bernoff, "Transient Anomalous Diffusion in Shear Flows," **J. Fluid Mech.** 441 (2001) 399-411.
28. S. Setayeshgar & A. J. Bernoff, "Scroll Waves in the Presence of Slowly Varying Anisotropy with Applications to the Heart", **Phys. Rev. Lett.** 88 (2002) #028101.
29. A. J. Bernoff & T. P. Witelski, "Linear Stability of Source-type Similarity Solutions to the Lubrication Equations," **Appl. Math. Lett.** 15 (2002) 599-606.
30. J. C. Miller* & A. J. Bernoff, "Rates of Convergence to Self-Similar Solutions of Burgers' Equation," **Stud. Appl. Math.** 111 (2003) 29-40.
31. T. P. Witelski, A. J. Bernoff, & A. L. Bertozzi, "The Dynamics of Dissipation and Blow-up for a Critical-case Unstable Thin Film Equation," **Euro. J. Appl. Math.** 15 (2004) 223-256.
32. T.D. Donnelly, J. Hogan*, A. Mugler*, N. Schommer*, & M. Schubmehl*, A. J. Bernoff, and B. Forrest* "An Experimental Study of Micron-scale Droplet Aerosols Produced via Ultrasonic Atomization," **Phys. Fluids.** 16 (2004) 2843-2851.
33. A. E. Hosoi, D. Kogan*, C.E. Devereaux*, A. J. Bernoff & S. M. Baker. "Two-Dimensional Self-Assembly in Diblock Copolymers," **Phys. Rev. Lett.** 95 (2005) #037801.
34. T.D. Donnelly, J. Hogan*, A. Mugler*, M. Schubmehl*, N. Schommer*, A. J. Bernoff, S. Dasnurkar & T. Ditmire "Using Ultrasonic Atomization to produce an Aerosol of Micron-scale Particles," **Rev. Sci. Instr.** 76 (2005) # 113301

35. J. C. Alexander, A. J. Bernoff, E.K. Mann, J. A. Mann, Jr. & L. Zou, "Hole Dynamics in Polymer Langmuir Layers," **Phys. Fluids** 18 (2006) # 062103.
36. J. C. Alexander, A. J. Bernoff, E.K. Mann, J. A. Mann, Jr., J.R. Wintersmith* & L. Zou, "Domain Relaxation in Polymer Langmuir Layers," **J. Fluid Mech.** 571 (2007) 191-219.
37. J.R. Wintersmith*, L. Zou, A. J. Bernoff, J. C. Alexander, J. A. Mann, Jr., E. E. Kooijman, & E.K. Mann. "Determination of Inter-Phase Line Tension in Langmuir Films," **Phys. Rev. E.** 75 (2007) #061605
38. C. M. Topaz, A. J. Bernoff, S. Logan*, & W. Toolson*, "Aggregations, Interactions, and Boundaries: A Minimal Model for Rolling Swarms of Locusts," **The European Physical Journal - Special Topics** 157 (2008) 93-109.
39. A. J. Leverentz*, C. M. Topaz & A. J. Bernoff. "Asymptotic Dynamics of Attractive-Repulsive Swarms, **SIAM J. Appl. Dyn. Sys.** 8 (2009) 880.
40. A. J. Bernoff & T. P. Witelski, "Stability and dynamics of self-similarity in evolution equations, **J. Eng. Math.**, 66 (2010) 11-31.
41. L. Zou, A. J. Bernoff, J. A. Mann, Jr., J. C. Alexander & E.K. Mann. "Gaseous hole closing in a polymer Langmuir monolayer," **Langmuir** 26 (2010) 3232-3236.
42. A. J. Bernoff & C. M. Topaz, "A primer of swarm equilibria," **SIAM J. Appl. Dyn. Sys.** 1 (2011) 212-250.
43. A.P. Higginbotham*, A. Guillen*, N. Jones*, T. D. Donnelly & A.J. Bernoff. "Evidence of the harmonic Faraday instability in ultrasonic atomization experiments with a deep, inviscid fluid," **J. Acoust. Soc. Am.** 130 (2011) 2694-2699.

Undergraduate co-authors indicated by *.

Mathematical Divertimenti

1. A. J. Bernoff & F. E. Su, "Putnam, Pizza, & Problem Solving," **Math Horizons** XII (September 2004) 8-9.
2. A. J. Bernoff, "Mathematics in the Mountains: The Park City Math Institute," **Math Horizons** XVII (November 2008) 20-21.

Papers in Preparation/Review

1. C.M. Topaz, M.R. D'Orsogna, L. Edelstein-Keshet, & A.J. Bernoff., "Desert locust dynamics: Behavioral phase change and swarming," Submitted to PLoS Comp. Bio, 2012.

Doctoral Thesis

- A. J. Bernoff, **Transitions from Order in Convection**, PhD Thesis, University of Cambridge (1986).

FELLOWSHIP & GRANTS (SELECTED)

CCMS Fletcher–Jones Grant

Analysis of Microfluidic Mixing in a Drop,

I am Co-PI on this award with Ali Nadim (CGU) which supported a summer research team of three undergraduates (two from HMC) and a graduate student.
Summer 2010.

NSF Division of Mathematical Sciences, Workforce Program

Optimizing the Mathematics Postdoctoral Experience: A Teaching and Research Postdoctoral Fellowship at Harvey Mudd College,

I am the Principal Investigator on this \$800,000 grant that will support five postdoctoral fellows and ten undergraduate summer researchers at Harvey Mudd College.
July 2009–June 2014.

NSF Division of Mathematical Sciences, ROA Supplement

This supplement to Robert Kohn’s grant *Mathematical Problems from Materials Science and Finance* provided partial support for my sabbatical at New York University’s Courant Institute of Mathematical Sciences.

September 2008–June 2009.

NSF Directorate of Engineering

Division of Chemical, Bioengineering, Environmental & Transport Systems

Dynamics of interfacial domains,

This is collaborative grant supporting work with an experimental group in the Physics Department at Kent State University and theorists in Mathematics and Chemical Engineering at Case Western Reserve University.

September 2007–August 2010.

NSF Division of Mathematical Sciences, Applied Mathematics Program

Research Training Group in Applied Differential Equations and Scientific Computing,

I am a Senior Scientist on this grant through UCLA that supports me and 6-8 Harvey Mudd Undergraduates each summer.

July 2006–June 2011.

Harvey Mudd College President’s Discretionary Fund Grant

Two Summer Research Experiences: Modeling the Swarming and Foraging of Fruit Flies & Domain Relaxation in Polymer Langmuir Layers

May 2006–April 2007.

Harvey Mudd College Faculty Research Grant

-*Domain Relaxation in Polymer Monolayers,*

May 2005–April 2006.

-*Refining Models and Measurement of Micron-Sized Liquid Droplet Formation*

May 2002–April 2003.

-*Models and Measurement of Micron-Sized Liquid Droplet Formation*

May 2001–April 2002.

Mellon Faculty Career Enhancement Grant

Dynamics and Stability of Self-similarity and the Navier-Stokes Equations,

Spring 2004.

NSF Division of Mathematical Sciences, Applied Mathematics Program,

Stability and Dynamics of Self-similarity in Evolution Equations,

July 1999–June 2002.

NSF Division of Mathematical Sciences

Postdoctoral Fellowship for the support of Dr. Louis F. Rossi,
Investigation of Vortex Monopole and Dipole Interactions,
July 1994 – August 1996 (Joint supervision with Prof. S. Lichter).

NSF Division of Mathematical Sciences, Applied Mathematics Program,
Intrinsic Equations of Motion for Interfaces in Models of Solidification,
July 1993–June 1996.

NSF Division of Mathematical Sciences, Special Projects
Mathematical Sciences Computing Research Environments,
September 1993–August 1995 (with Prof. W. L. Kath & Prof. H. Riecke).

NSF Division of Chemical and Thermal Systems,
Fluid, Particulate & Hydraulic Systems Program,
Evolution and Viscous Decay of Dipolar Vortex Couples in 2D Fluid Mechanics,
August 1992–August 1995 (with Prof. S. Lichter).

NSF Division of Mathematical Sciences,
Postdoctoral Fellowship for the support of Dr. Andrew Bernoff,
Existence and Motion of Topological Defects in Nonlinear Evolution Equations
June 1990 – May 1992 (Supervised by Prof. J. Neu, Univ. of Calif., Berkeley).

INVITED TALKS (SELECTED)

Park City Mathematical Institute (2003, 2005-2011) Park City, UT
Pizza and Problem Solving Seminars: Problem solving seminars for roughly 200 secondary school teachers, undergraduate and graduate students and college faculty.

- *Digits and Divisibility* on July 19, 2011
- *The Sum of the Parts* on July 7, 2011
- *The Extreme Principle* on July 13, 2010
- *Induction and Recursion* on July 1, 2010
- *Parity & Counting* on July 14, 2009
- *Pigeonhole Principle* on July 2, 2009
- *Lattice Points and Polygons* on July 22, 2008
- *Hidden Symmetries* on July 10, 2008
- *Mathematical Games* on July 21, 2007
- *Some Random Problems from Probability* on July 5, 2007
- *Digits and Divisibility* on July 11, 2006
- *The Sum of the Parts* on July 1, 2005
- *Parity and Invariants* on July 14, 2003
- *Induction and Deduction* on July 7, 2003

Cecil T. and Marion C. Holmes Mathematics Lecture

An Introduction to Surface Tension (Or Why Raindrops are Spherical)
April 13, 2009 Bowdoin College, Bowdoin, ME

Similarity: Generalizations, Applications and Open Problems

Invited Speaker (Two talks)

- *Stability and Dynamics of Self-similarity in Evolution Equations*
 - *Asymptotic Dynamics of Attractive-Repulsive Swarms*
- August 11-15, 2008 UBC, Vancouver, CA

Frontiers in Applied and Computational Mathematics

Invited Speaker

Domain Relaxation in Polymer Langmuir Layers

May 15, 2006 NJIT, Newark, NJ

UCLA-IPAM-NSF Workshop on Thin Films and Fluid Interfaces

Invited Speaker

Domain Relaxation in Polymer Langmuir Layers

February 1, 2006 UCLA, Los Angeles, CA

AMS-MAA 2006 Annual Meeting

Invited Speaker in AMS-MAA-MER Special Session on Mathematics and Education Reform

Pizza, Problem-Solving, and Promoting a Math-Friendly Culture

January 13, 2006 San Antonio, TX

Park City Mathematical Institute

Workshop Leader and Organizer of Undergraduate Faculty Program

Harmonic Analysis and Partial Differential Equations in the Undergraduate Curriculum

A three week long workshop for faculty at undergraduate colleges

sponsored by the Institute for Advanced Study.

June 29-July 19, 2003 Park City, UT

COLLOQUIA

In the last ten years I have spoken at:

- Boston University
- California Institute of Technology
- Duke University
- Harvard University
- Mathematical Sciences Research Institute
- New York University (CIMS)
- Pennsylvania State University
- Rensslear Polytechnical Institute
- Stanford University
- University of Arizona
- University of California, Berkeley
- University of California, Santa Cruz
- University of California, Santa Barbara
- University of Nottingham
- Bowdoin College
- Case Western Reserve University
- George Mason University
- Massachusetts Institute of Technology
- New Jersey Institute of Technology
- Ohio State University
- Princeton University
- Santa Clara University
- Simon Fraser University
- University of British Columbia
- University of California, Los Angeles
- University of California, San Diego
- University of Cambridge
- Vassar College

CONFERENCES, WORKSHOPS & MINISYMPOSIA CO-ORGANIZED (SELECTED)

Moody Lecture Series

Co-founded, co-organized and raised money for this endowed Harvey Mudd College lecture series.

Mel Henriksen Memorial Conference

Co-organized a one day conference at Harvey Mudd College to commemorate the long and productive career of my former colleague, Mel Henriksen.

March 27, 2010

Harvey Mudd College

Park City Mathematical Institute

I was on the steering committee and co-organized the Undergraduate Faculty Program and Undergraduate Summer School of this three-week summer school for research mathematicians, undergraduate faculty, graduate students, undergraduates, and high school teachers sponsored by the Institute for Advanced Study.

- PCMI 2011: *Moduli Spaces of Riemann Surfaces* July 3-23, 2011
- PCMI 2010: *Image Processing* June 27-July 17, 2010
- PCMI 2009: *Arithmetic of L-functions* June 28-July 18, 2009
- PCMI 2008: *Analytic and Algebraic Geometry* July 6-25, 2008

SIAM Annual Meeting Undergraduate Poster Session

I co-founded and am co-organizing the undergraduate poster session at the Society for Industrial and Applied Mathematics annual meeting.

- Inaugural Poster Session on July 8, 2008 San Diego, CA
- Second Annual Poster Session on July 7, 2009 Denver, CO
- Third Annual Poster Session on July 13, 2010 Pittsburgh, PA

SIAM Annual Meeting

Co-organizing Invited Minisymposium:

Title: *Undergraduate Research in Dynamical Systems*

July 8, 2008 San Diego, CA

SIAM Conference on Applications of Dynamical Systems

Co-organized Minisymposium:

Title: *Individual and Collective Motion in Biology*

May 28, 2007 Snowbird, UT

HMC 2020: Optimizing the HMC Experience

I co-chaired a one-day Strategic Planning Workshop with roughly 250 participants.

October 20, 2006 Harvey Mudd College

Localization Behavior in Reaction-Diffusion Systems and Applications to the Natural Sciences

A week long workshop with international participants.

August 9-16, 2003 Banff International Research Station, Canada

Microfluidics Workshop

A two day workshop designed to bring theorist and experimentalists together across disciplines.

November 12-13, 2002 Institute for Pure and Applied Mathematics, UCLA

Mt. Baldy Conference on Applied Mathematics

A one day conference of selected talks in Applied Mathematics.

October 28, 2000 Harvey Mudd College