ANDREW JOEL BERNOFF

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EDUCATION

University of Cambridge (Trinity College)
Ph.D. in Applied Mathematics, 1988

Massachusetts Institute of Technology
B.S. in Applied Math, 1982
B.S. in Physics, 1982

EMPLOYMENT

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

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

HONORS AND AWARDS

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

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. Lingevitch & 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. Lingevitch, "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. Lingevitch & 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. Lingevitch & 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," To appear in **The European Physical Journal Special Topics** (2008) .

Mathematical Divertimenti

- A. J. Bernoff & F. E. Su, "Putnam, Pizza, & Problem Solving," **Math Horizons** 12 (2004) 8-9.

Papers in Preparation/Review

1. A. J. Leverentz, C. M. Topaz & A. J. Bernoff "Asymptotic Dynamics of Attractive-Repulsive Swarms," submitted to SIAM Journal of Applied Dynamical Systems.

2. A. J. Bernoff & C. M. Topaz, "Equilibrium configurations of interacting particles in one dimension," in preparation.

Doctoral Thesis

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

GRADUATE & POSTDOCTORAL RESEARCH STUDENTS

Graduate

David Sarocka, Ph.D. June 1996	Northwestern University
Joseph Lingevitch, Ph.D. June 1995	Northwestern University
J. H. M. van Dongen, M.S. in Mechanical Engineering, 1994	Northwestern University

Postdoctoral

Dr. Louis Rossi, NSF Mathematical Sciences Postdoctoral Research Fellowship,

UNDERGRADUATE RESEARCH STUDENTS

Andrew Leverentz, HMC 2008	Harvey Mudd College
George Tucker, HMC 2008	Harvey Mudd College
Kazh Brito, HMC 2007	Harvey Mudd College
Joseph Majkut, HMC 2006	Harvey Mudd College
Benjamin Azose, HMC 2006	Harvey Mudd College
Sheldon Logan, HMC 2006	Harvey Mudd College
Wyatt Toolson, HMC 2006	Harvey Mudd College
Jacob Pugh, HMC 2006	Harvey Mudd College
Robin Baur, HMC 2006	Harvey Mudd College
Dan Beutel, B.S. 2003	Harvey Mudd College
Benjamin Bryant, B.S. 2003	Harvey Mudd College
Dmitriy Kogan, B.S. 2003	Harvey Mudd College
Michael Gratton, B.S. 2002	Harvey Mudd College
Bradley Forrest, B.S. 2002	Harvey Mudd College
Marco Latini, B.S. 2001	Harvey Mudd College
Anand Patil, B.S. 2001	Harvey Mudd College
Bryan Tysinger, B.S. 2001	Harvey Mudd College
Joel Miller, B.S. 2000	Harvey Mudd College
W. Douglas Wilson, B.S. 1998	Northwestern University

FELLOWSHIP & GRANTS (RECENT, SELECTED)

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 2009.

NSF Division of Mathematical Sciences, Applied Mathematics Program
Research Training Group in Applied Differential Equations and Scientific Computing,
This grant through UCLA supports me and 6-8 Harvey Mudd Undergraduates each summer.
July 2006–June 2011.

NSF Division of Mathematical Sciences, Applied Mathematics Program,
Stability and Dynamics of Self-similarity in Evolution Equations,
July 1999–June 2002.