

Curriculum Vitæ of Jean-Luc Thiffeault

Contact Information

Jean-Luc Thiffeault

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Education

September 1995–December 1998

Ph.D. in Physics

University of Texas at Austin

September 1993–August 1995

M.A. in Physics

University of Texas at Austin

September 1990–May 1993

B.S. in Physics

McGill University, Montréal, Canada

Post-PhD Positions Held

September 2013–present

Professor of Mathematics, University of Wisconsin, Madison

September 2010–present

Associate Professor of Mathematics, University of Wisconsin, Madison

August 2007–August 2010

Assistant Professor of Mathematics, University of Wisconsin, Madison

October 2007–December 2007

Reader in Applied Mathematics, Imperial College London, Department of Mathematics (on leave)

January 2003–October 2007

Lecturer in Applied Mathematics, Imperial College London, Department of Mathematics (on leave after August 2007)

July 2001–December 2002

Associate Research Scientist, Columbia University,
Department of Applied Physics and Applied Mathematics

June 1999–June 2001

Postdoctoral Research Fellow, Columbia University,
Department of Applied Physics and Applied Mathematics

January 1999–May 1999

Postdoctoral Research Fellow, University of Texas at Austin Physics Department

Visiting Positions*September 2009–June 2010*

Long-term Visitor, Institute for Mathematics and its Applications, Minneapolis, MN.

June 2009–July 2009

CNRS Visiting Professor, Université de Toulon-Var, France

February 2007–May 2007

CNRS Visiting Professor, Centre de Physique Théorique, Université de Marseille, France

*2007–present**June 2005–August 2005**July 2004**June 2003–August 2003**June 2002–August 2002**June 2000–August 2000**June 1999–August 1999*

Guest Investigator, Woods Hole Oceanographic Institution

Honors and Awards

AMS Invited Address, SIAM Annual Meeting	2014
Plenary speaker, AMS Central Section Meeting	2014
Plenary speaker, SIAM Dynamical Systems Meeting	2013
SIAM Outstanding Paper Prize	2012
Principal Lecturer, Woods Hole GFD Summer Program	2010
Honored Instructor (awarded by students)	2010
CNRS Visiting Professor, Université de Toulon-Var, France	2009
CNRS Visiting Professor, Centre de Physique Théorique, Université de Marseille, France	2007
Faculty of the GFD Summer Program at the Woods Hole Oceanographic Institution	2002–
FCAR Postgraduate Scholarship	1997–98
WHOI Geophysical Fluid Dynamics Fellowship	1996
NSERC Postgraduate Scholarship	1993–97
NSERC Summer Research Scholarship	1993
Horace Watson Medal and Prize in Physics	1993
J. W. McConnell Award	1992
Anne Molson Scholarship	1992
NSERC Summer Research Scholarship	1992
Hewlett-Packard Prize in Science	1991
E. P. Aikman Prize in Physics	1991
E. R. Crawford Scholarship	1991

Publications*In Submission*

52. J.-L. Thiffeault, (2014) “Short-time distribution of particle displacements due to swimming microorganisms,” in submission. <http://arxiv.org/abs/1403.4781> (61 pages)

51. H. Aref *et al.*, (2014) “Frontiers of chaotic advection,” in submission. <http://arxiv.org/abs/1403.2953> (61 pages)

50. N. J. Balmforth, P. J. Morrison, and J.-L. Thiffeault, (2014) “Pattern formation in Hamiltonian systems with continuous spectra,” in submission. <http://arxiv.org/abs/1303.0065> (56 pages)

Published in Refereed Journals

49. Tamasz, S. E., and Thiffeault, J.-L. (2013) “Topological entropy and secondary folding,” *Journal of Nonlinear Science* **23**, 511–524.
48. Puckett, J. G., Lechenault, F., Daniels, K. E., and Thiffeault, J.-L. (2012) “Trajectory entanglement in dense granular materials,” *Journal of Statistical Mechanics: Theory and Experiment*, **2012**, P06008 (13 pages).
47. Thiffeault, J.-L. (2012) “Using Multiscale Norms to Quantify Mixing and Transport,” *Nonlinearity* **25**, R1–R44. **Invited review article**
46. Allshouse, M. R., and Thiffeault, J.-L. (2012) “Detecting Coherent Structures Using Braids,” *Physica D* **241**, 95–105.
45. Finn, M. D., and Thiffeault, J.-L. (2011) “Topological Optimisation of Rod-stirring Devices,” *SIAM Review* **53**, 95–105. **Cover image. 2012 SIAM Outstanding Paper Prize.**
44. Thomases, B., Shelley, M., and Thiffeault, J.-L. (2011) “A Stokesian Viscoelastic Flow: Transition to Oscillations and Mixing,” *Physica D* **240**, 1602–1614.
43. Thiffeault, J.-L., Gouillart, E., and Dauchot, O. (2011) “Moving Walls Accelerate Mixing,” *Physical Review E* **84**, 036313 (8 pages).
42. Lanneau, E., and Thiffeault, J.-L. (2011) “On the Minimum Dilatation of Braids on the Punctured Disc,” *Geometriae Dedicata* **152**, 165–182.
41. Lin, Z., Thiffeault, J.-L., and Doering, C. R. (2011) “Optimal Stirring Strategies for Passive Scalar Mixing,” *Journal of Fluid Mechanics* **675**, 465–476.
40. Lanneau, E., and Thiffeault, J.-L. (2011) “On the Minimum Dilatation of pseudo-Anosov Homeomorphisms on Surfaces of Small Genus,” *Annales de l’Institut Fourier* **61**, 105–144.
39. Lin, Z., Thiffeault, J.-L., and Childress, S. (2011) “Stirring by Squirmer,” *Journal of Fluid Mechanics* **669**, 166–177.
38. Gouillart, E., Dauchot, O., Thiffeault, J.-L. (2011) “Measures of Mixing Quality in Open Flows with Chaotic Advection,” *Physics of Fluids* **23**, 013604 (11 pages).
37. Thiffeault, J.-L., and Doering, C. R. (2011) “The Mixing Efficiency of Open Flows,” *Physica D* **240**, 180–186.
36. Thiffeault, J.-L., and Childress, S. (2010) “Stirring by Swimming Bodies,” *Physics Letters A* **374**, 3487–3490 (4 pages). **Covered by Physics World as a News item (<http://physicsworld.com/cws/article/news/41178>)**
35. Ó Náraigh, L., and Thiffeault, J.-L. (2010) “Nonlinear Dynamics of Phase Separation in Thin Films,” *Nonlinearity* **23**, 1559 (25 pages).
34. Gouillart, E., Thiffeault, J.-L., and Dauchot, O. (2010) “Rotation Shields Chaotic Mixing Regions from No-slip Walls,” *Physical Review Letters* **104**, 204502 (4 pages).
33. Thiffeault, J.-L. (2010) “Braids of Entangled Particle Trajectories,” *Chaos* **20**, 017516 (14 pages). **Featured as a Research Highlight in Chaos; Most downloaded article from February to June 2010.**
32. Gouillart, E., Dauchot, O., Thiffeault, J.-L., and Roux, S. (2009) “Open-flow Mixing: Experimental Evidence for Strange Eigenmodes,” *Physics of Fluids* **21**, 023603 (11 pages).
31. Ó Náraigh, L., and Thiffeault, J.-L. (2008) “Bounds on the Mixing Enhancement for a Stirred Binary Fluid,” *Physica D* **237**, 2673–2684.
30. Gouillart, E., Dauchot, O., Dubrulle, B., Roux, S., and Thiffeault, J.-L. (2008) “Slow Decay of Concentration Variance Due to No-slip Walls in Chaotic Mixing,” *Physical Review E* **78**, 026211 (17 pages).

29. Thiffeault, J.-L., Finn, M. D., Guillard, E., and Hall, T. (2008) “Topology of Chaotic Mixing Patterns,” *Chaos* **18**, 033123 (8 pages).
28. Okabe, T., Eckhardt, B., Thiffeault, J.-L., and Doering, C. R. (2008) “Mixing Effectiveness Depends on the Source-sink Structure: Simulation Results,” *Journal of Statistical Mechanics: Theory and Experiment* **2008**, P07018 (13 pages).
27. Thiffeault, J.-L., and Pavliotis, G. A. (2008) “Optimizing the Source Distribution in Fluid Mixing,” *Physica D* **237**, 918–929.
26. Ó Náraigh, L., and Thiffeault, J.-L. (2007) “Dynamical Effects and Phase Separation in Cooled Binary Fluid Films,” *Physical Review E* **76**, 035303 (4 pages).
25. Guillard, E., Kuncio, N., Dauchot, O., Dubrulle, B., Roux, S., and Thiffeault, J.-L. (2007) “Walls Inhibit Chaotic Mixing,” *Physical Review Letters* **99**, 114501 (4 pages).
Covered by *Physics World* as a News item (<http://physicsworld.com/cws/article/news/31199>)
24. Shaw, T. A., Thiffeault, J.-L., and Doering, C. R. (2007) “Stirring up Trouble: Multi-scale Mixing Measures for Steady Scalar Sources,” *Physica D* **231**, 143–164.
23. Finn, M. D., and Thiffeault, J.-L. (2007) “Topological Entropy of Braids on the Torus,” *SIAM Journal on Applied Dynamical Systems* **6**, 79–98.
22. Ó Náraigh, L., and Thiffeault, J.-L. (2007) “Bubbles and Filaments: Stirring a Cahn–Hilliard Fluid,” *Physical Review E* **75**, 016216 (11 pages).
21. Thiffeault, J.-L., and Finn, M. D. (2006) “Topology, Braids, and Mixing in Fluids,” *Philosophical Transactions of the Royal Society A* **364**, 3251–3266.
20. Roy, A., Mahadevan, L., and Thiffeault, J.-L. (2006) “Fall and Rise of a Viscoelastic Fluid Filament,” *Journal of Fluid Mechanics* **563**, 283–292.
19. Finn, M. D., Thiffeault, J.-L., and Guillard, E. (2006) “Topological Chaos in Spatially Periodic Mixers,” *Physica D* **221**, 92–100.
18. Doering, C. R., and Thiffeault, J.-L. (2006) “Multiscale Mixing Efficiencies for Steady Sources,” *Physical Review E* **74**, 025301 (4 pages).
17. Guillard, E., Thiffeault, J.-L., and Finn, M. D. (2006) “Topological Mixing with Ghost Rods,” *Physical Review E* **73**, 036311 (8 pages).
16. Thiffeault, J.-L. (2005) “Measuring Topological Chaos,” *Physical Review Letters* **94**, 084502 (4 pages).
15. Thiffeault, J.-L., Doering, C. R., and Gibbon, J. D. (2004) “A Bound on Mixing Efficiency for the Advection–Diffusion Equation,” *Journal of Fluid Mechanics* **521**, 105–114.
14. Thiffeault, J.-L. (2004) “Stretching and Curvature along Material Lines in Chaotic Flows,” *Physica D* **198**, 169–181.
13. Thiffeault, J.-L. (2004) “The Strange Eigenmode in Lagrangian Coordinates,” *Chaos* **14**, 531–538.
12. Spiegel, E. A., and Thiffeault, J.-L. (2003) “Fluid Equations for Rarefied Gases,” *Physics of Fluids* **15**, 3558–3567.
11. Thiffeault, J.-L., and Childress, S. (2003) “Chaotic Mixing in a Torus Map,” *Chaos* **13**, 502–507.
10. Thiffeault, J.-L. (2003) “Advection–Diffusion in Lagrangian Coordinates,” *Physics Letters A* **309**, 415–422.
9. Thiffeault, J.-L. (2003) “Finite Extension of Polymers in Turbulent Flow,” *Physics Letters A* **308**, 445–450.
8. Thiffeault, J.-L., and Boozer, A. H. (2003) “The Onset of Dissipation in the Kinematic Dynamo,” *Physics of Plasmas* **10**, 259–265.

7. Thiffeault, J.-L. (2002) “Derivatives and Constraints in Chaotic Flows: Asymptotic Behaviour and a Numerical Method,” *Physica D* **172**, 139–161.
6. Thiffeault, J.-L. (2001) “Covariant Time Derivatives for Dynamical Systems,” *Journal of Physics A* **34**, 5875–5885.
5. Thiffeault, J.-L., and Morrison, P. J. (2001) “The Twisted Top,” *Physics Letters A* **283**, 335–341.
4. Thiffeault, J.-L., and Boozer, A. H. (2001) “Geometrical Constraints on Finite-time Lyapunov Exponents in Two and Three Dimensions,” *Chaos* **11**, 16–28.
3. Smith, J. P., Thiffeault, J.-L., and Horton, W. (2000) “Dynamical Range of the WINDMI Model: An Exploration of Possible Magnetospheric Plasma States,” *Journal of Geophysical Research—Space Physics* **105**(A6), 12983–12996.
2. Thiffeault, J.-L., and Morrison, P. J. (2000) “Classification and Casimir Invariants of Lie–Poisson Brackets,” *Physica D* **136**, 205–244.
1. Thiffeault, J.-L., and Horton, W. (1996) “Energy-conserving Truncations for Convection with Shear Flow,” *Physics of Fluids* **8**, 1715–1719.

Papers in Refereed Conference Proceedings

- C4. Thiffeault, J.-L., and Kamhawi, K. (2008) “Chaotic Geodesics,” Proceedings of the Conference on *Chaos, Complexity, and Transport*, Le Pharo, Marseille, June 2007.
- C3. Thiffeault, J.-L. (2008) “Scalar Decay in Chaotic Mixing,” in *Transport and Mixing in Geophysical Flows*, Proceedings of the Gran Combin Summer School, Valle d’Aosta, Italy, 14–24 June 2004. *Lecture Notes in Physics* **744**, 3–35 (Springer-Verlag, Berlin).
- C2. Hong, S., Thiffeault, J.-L., Fréchette, L., Modi, V. (2003) “Numerical Study of Mixing in Microchannels with Patterned Zeta Potential Surfaces,” Paper presented at IMECE 2003, ASME International Mechanical Engineering Congress & Exposition, Washington, D.C., November 16–21.
- C1. Thiffeault, J.-L., and Morrison, P. J. (1998) “Invariants and Labels in Lie–Poisson Systems,” Proceedings of the 13th Florida Workshop in Astronomy and Physics. *Annals of the New York Academy of Sciences* **867**, 109–119.

Selected Unrefereed Proceedings, Contributed Papers, and Technical Reports

- J.-L. Thiffeault, (2014) “Braidlab: A Software Package for Braids and Loops,”
<http://arxiv.org/abs/1410.0849>
- Obuse, K., and Thiffeault, J.-L. (2011) “A low-Reynolds-number treadmilling swimmer near a semi-infinite wall,” to appear in *IMA Volume on Natural Locomotion in Fluids and on Surfaces: Swimming, Flying, and Sliding*, edited by Stephen Childress, Anette (Peko) Hosoi, William W. Schultz, and Z. Jane Wang.
- Thiffeault, J.-L. (2010) “Chaos in the Gulf,” *Science* **330**, 458–459, October 2010. **Invited Perspective Article on the Gulf Oil Spill.**
- Thiffeault, J.-L., Lanneau, E., and Matz, S. (2009) “The Cat’s Cradle, Stirring, and Topological Complexity,” *Dynamical Systems Magazine*, April 2009.
- Thiffeault, J.-L., Gouillart, E., and Finn, M. D. (2005) “The Size of Ghost Rods,” in *Workshop on Analysis and Control of Mixing with Applications to Micro and Macro Flow Processes*, Udine, Italy, 1 July 2005. (Springer Verlag).
- Spiegel, E. A., and Thiffeault, J.-L. (2003) “Continuum Equations for Stellar Dynamics,” in *Stellar Astrophysical Fluid Dynamics: Proceedings of the Chateau de Mons meeting* (Cambridge University Press, U.K.).
- Thiffeault, J.-L. (1997) “Long-wave Instability in Double-diffusive Marangoni Convection,” Woods Hole Oceanographic Institution Technical Report, WHOI-97-10, 269–286.

*Theses**December 1998*

Ph.D. Dissertation

“Classification, Casimir Invariants, and Stability of Lie–Poisson Systems.”

Institute for Fusion Studies Report No. 847, 1–150.

August 1995

Master’s Thesis

“Modeling Shear Flow in Rayleigh–Bénard Convection.”

Institute for Fusion Studies Report No. 715, 1–62.

Invited Presentations

More than **90 invited research seminars and colloquia** at various institutions, including Alberta, Arizona, Boston U., Bristol, Cambridge, Chicago, Columbia, Edinburgh, Exeter, Georgiatech, Harvard, Imperial College London, Leeds, Los Alamos, McGill, Michigan, Minnesota, MIT, New York University, U. North Carolina, NC State, Northwestern, Nottingham, Oxford, Penn State, Princeton, Scripps, Simon Fraser, Stanford, Sydney, Texas, Minnesota, University College London, UCSD, Wisconsin, Woods Hole, and Yale.

Plenary speaker at *SIAM Conference on Applications of Dynamical Systems*, Snowbird, Utah, 2013. (9 plenary speakers out of 800 participants.)

Talk at *Workshop on Tangled Magnetic Fields in Astro- and Plasma Physics*, International Centre for Mathematical Sciences, Edinburgh, Scotland, October 2012.

Plenary speaker at *Workshop on Topological Fluid Dynamics (IUTAM Symposium)*, Newton Institute, Cambridge, UK, July 2012.

Minisymposium talks (2) at *AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, FL, July 2012.

Minisymposium talk at *SIAM Conference on Nonlinear Waves and Coherent Structures*, Seattle, WA, June 2012.

“Extracting flow information from sparse Lagrangian trajectories.” Talk at the *Euler Lagrangian Meeting*, Wolfgang Pauli Institute, Vienna, Austria, 7 May 2012.

Talk at *Workshop on Complex Fluids and Flows in Industry and Nature*, Vancouver, Canada, 14 July 2011.

Talk at *Workshop on Braids and Their Applications*, Pisa, Italy, 22 June 2011.

Talk at *Workshop on Waves and Stability in Continuous Media*, Brindisi, Italy, 15 June 2011.

“Topological detection of Lagrangian coherent structures.” Talk at *SIAM Conference on Applications of Dynamical Systems*, Snowbird, Utah, 22 May 2011.

“Topological detection of Lagrangian coherent structures.” Talk at the *Workshop on Coherent Structures*, Lorentz Centre, The Netherlands, 19 May 2011.

“Topological methods for stirring and mixing.” **Plenary Talk** at the *Workshop on Physics of Mixing*, Lorentz Centre, The Netherlands, 24 January 2011.

Principal Lecturer, 2010 Summer Program in Geophysical Fluid Dynamics, Woods Hole Oceanographic Institution, Woods Hole, MA.

“Do Fish Stir the Ocean?” Talk at *Fluid Dynamics: From Theory to Experiments*, Montana State University, Bozeman, MT, 10 June 2010.

“Do Fish Stir the Ocean?” Talk at the *Workshop on Transport and Mixing in Complex and Turbulent Flows*, Institute for Mathematics and its Applications, Minneapolis, MN, 14 April 2010.

“Exact Topological Entropy for Some Non-hyperbolic Maps.” Talk at the *Spring Central Section Meeting of the American Mathematical Society*, St. Paul, MN, 10 April 2010.

Lecturer, ‘Tag Team Tutorials: Transport & Mixing in Incompressible Fluid Flows’ (with Charles R. Doering), Institute for Mathematics and its Applications, Minneapolis, MN, Spring 2010.

“Pseudo-Anosovs with Small Dilatation.” Talk at the *Spring Topology and Dynamics Conference*, Mississippi State University, 19 March 2010.

“Nonlinear Dynamics of Phase Separation in Thin Films.” Talk at the *Workshop on Small scale hydrodynamics: microfluidics and thin films*, Banff International Research Station, Alberta, Canada, 8 February 2010.

“Topological Dynamics: Probing Dynamical Systems using Loops.” Talk at *Chaos/Xaoc 20th Anniversary Conference*, National Academy of Sciences, Woods Hole, MA, 26 July 2009.

“pseudo-Anosovs in the Real World” (*Bouillabaisse seminar*: invited talk after conference dinner), *H. Masur 60th Birthday Conference on Teichmüller Geometry*, CIRM, Luminy, France, 25 June 2009.

“Orbits that Stir.” Talk at *SIAM Conference on Applications of Dynamical Systems*, Snowbird, Utah, 20 May 2009.

“The Role of Walls in Chaotic Mixing: Experimental Results.” Talk at the *Second Canada–France Congress*, Montréal, Canada, 3 June 2008.

“A Topological Theory of Rod Stirring.” Talk at *Chaos, Complexity and Transport Conference: Theory and Applications*, Marseilles, France, 4–8 June 2007.

“Topological Mixing of Viscous Fluids.” Talk at the *Journées de la Matière Condensée*, Université Paul Sabatier, Toulouse, France, 31 August 2006.

“Computing the Topological Entropy of Braids, Fast.” Talk at the *Workshop on Computation and Topology in Dynamics*, Lorentz Centre, The Netherlands, 18 May 2006.

“Chaotic Advection in Thin Films?” Talk at the *Frontiers in Applied and Computational Mathematics* meeting, New Jersey Institute of Technology, Newark, NJ, 16 May 2006.

“Topological Chaos in Spatially Periodic Domains.” Talk at the *Workshop on Analysis and Control of Mixing with Applications to Micro and Macro Flow Processes*, Udine, Italy, 1 July 2005.

“Topological Kinematics of Mixing.” Talk at the *SIAM Meeting on Applications of Dynamical Systems*, Snowbird, Utah, 24 May 2005

“The Rate of Mixing of a Passive Scalar: Local and Global Views.” Lectures at the *XIIth Grand Combin Summer School*, Valle d’Aosta, Italy, June 2004.

“Bounds on Mixing Efficiency.” Talk at the *Second LMS Meeting on Mixing and its Applications*, Bristol, May 2004.

“A Bound on Mixing Efficiency.” Talk at the *Geometrical Methods in GFD meeting*, Pitlochry, Scotland, 22 April 2004.

“Large-scale Eigenfunctions and Mixing.” Talk at the *New Themes in Plasma and Fluid Turbulence* meeting, Royal Society, London, May 2003.

“Nonlinear MHD Stability and Dynamical Accessibility.” Talk at the *APS Division of Plasma Physics* meeting, Orlando, FL, November 2002.

“Hamiltonian Dynamics from Lie–Poisson Brackets.” Talk at the *Workshop on Hamiltonian Dynamical Systems*, Imperial College, London, 12 February 2002.

Outreach Presentations

- “The mathematics of juggling.” Talk at the *Madison Math Circle*, Madison, WI, 4 November 2013.
- “Making taffy with the Golden mean.” Talk at the *Madison Math Circle*, Madison, WI, 11 February 2013.
- “Making taffy with the Golden mean.” Talk at the *Math Club*, Madison College, WI, 25 January 2013.
- “The hagfish: the slimiest fish in the sea.” Talk at the *Madison Math Circle*, Madison, WI, 5 March 2012.
- “Making taffy with the Golden mean.” Talk at the *Wisconsin Science, Math & Engineering Symposium*, Madison, WI, 23 February 2012.
- “Making taffy with the Golden mean.” Talk at the *Madison Math Circle*, Madison, WI, 7 November 2011.
- “Making taffy with the Golden mean.” Talk at the Krannert Art Museum, Champaign, IL, 29 October 2011.
- “Stirring with braids.” Talk at the *Wisconsin Math Night*, Madison, WI, 21 February 2008.
- “Stirring with braids.” Talk at Concord College, UK, 30 January 2007.

Teaching Experience

August 2007–present

Assistant/Associate Professor of Mathematics, University of Wisconsin, Madison

Classes taught: Mathematical Fluid Dynamics (Math 705, Fall 2007, 2008, 2010), Braids (Math 801, Spring 2008), Calculus & Analytic Geometry (Math 221, Spring 2008, Fall 2010, Math 217, Spring 2009), Chaos & Dynamical Systems (Math 415, Fall 2008), Elementary Algebraic and Geometric Topology (Math 552, Spring 2011), Applied Mathematical Analysis I (Math 321, Spring 2012–2013), Applied Mathematical Analysis II (Math 322, Fall 2011, Spring 2012, Fall 2013), Methods of Applied Mathematics I (Math 703, Fall 2012–2014), Mixing (Math 801, Spring 2013), Numerical Analysis II (Math 715, Spring 2014).

January 2003–August 2007

Lecturer/Reader in Applied Mathematics, Imperial College London

Department of Mathematics

Classes taught: Advanced Inviscid Flow Theory (Spring 2003, 2004), Mathematics for Biomedical Engineers (Autumn 2003), Inviscid Flow Theory (Autumn 2004–2006), Mathematics for Information Systems Engineers (Autumn 2004, 2005), Mathematics for Chemists (Autumn 2006).

August 1993–May 1994

Teaching Assistant, University of Texas at Austin Physics Department

Supervisor: C. Ken Shih

Conducted review sessions for the tests and homework. Participated in the writing of test questions and grading of homework assignments.

Students and Postdoctoral Fellows Supervised

Postdoctoral Fellows

Marko Budišić (*September 2013–present*)

Matthew D. Finn (*October 2004–February 2007*)

PhD Students

Thomas Morrell (*January 2014–present*; jointly supervised with Saverio Spagnolie)

Huanyu Wen (*June 2013–present*)

Peter Mueller (*January 2012–present*)

Sarah Tumasz (*September 2008–December 2012*)

Khalid Kamhawi (*October 2004–June 2009*)

Lennon O’Naraigh (*October 2005–February 2008*)

Emmanuelle Gouillart (*October 2004–October 2007*; jointly supervised with Olivier Dauchot)

Summer Research Students (GFD Program, Woods Hole)

Kiori Obuse (*2010*)

Amanda O’Rourke (*2010*)

Michael Allshouse (*2010*)

Tiffany Shaw (*2005*)

Anshuman Roy (*2005*)

Undergraduate Research Students

Alex Flanagan (*2012–present*)

Colin Wahl (*2013–present*; jointly supervised with Saverio Spagnolie)

Joseph Lukasic (*2013–2014*; jointly supervised with Saverio Spagnolie)

Jay Johnson (*2012–2014*)

Natalie Cook (*2012*)

Tedman Martinez-Roja (*2011*)

Andrew Kirby (*2010*)

Matthew Harrington (*2009*)

Masters Students

Claire Blackman (*MA, 2012*)

Douglas Murdoch (*MSci, 2007*)

Stanislas Pamela (*MSci, 2007*)

Sapna Hars (*MSc, 2006*)

Ophir Samson (*MSci, 2006*)

Andrew Wong (*MSci, 2006*)

Joseph Kibui (*MSci, 2005*)

Rhodri Nelson (*MSc, 2005*)

Trishna Patel (*MSci, 2005*)

Stefan Sadokierski (*MSc, 2005*)

Martin Ewart (*MSci, 2004*)

Thomas Brickell (*MSc, 2004*)

Grants Awarded and Consultations

September 2013–August 2014

World Universities Network Fund for International Research Collaboration Grant on *Topological, measure-theoretic and stochastic dynamics in fluid mixing*, Co-Pi with Rob Sturman (PI) and Georg Gottwald, £12,000.

September 2012–August 2015

NSF (CMMI) Grant on *Collaborative Research: A New Braid Theoretic Approach to Uncovering Transport Barriers in Complex Flows* (PI), \$260,000 (co-PI Thomas Peacock of MIT awarded \$270,000).

August 2011–July 2014

NSF (DMS) Grant on *Mixing by Microorganisms* (PI), \$220,000.

August 2009–July 2011

NSF (DMS) Grant on *SCREMS: Scientific Computing Research Environments for the Mathematical Sciences*, Co-PI with Amir Assadi (PI), \$183,000.

August 2008–July 2011

NSF (DMS) Grant on *Topological Characterization and Optimization of Mixing* (PI), \$200,000.

June 2009–August 2013

NSF (OCE) Support Grant for the *Summer Program in Geophysical Fluids Dynamics* at the Woods Hole Oceanographic Institution. Co-PI with Karl Helfrich (PI), Claudia Cenedese, and Charles Doering.

October 2004–October 2007

Consultant, Saint-Gobain Recherche. In addition, SGR sponsored my graduate student, Emmanuelle Gouillart, for the duration of her PhD.

October 2004–February 2007

EPSRC Grant, “Optimisation and Intermittency of Mixing using a Bounding Approach.” (£122,000). Supported a Postdoctoral Research Assistant (Now Prof. Matthew D. Finn at University of Adelaide).

December 2003

Office of Naval Research — International Field Office under the Visitor Support Program (grant of \$20,000 towards travel of seven international scientists to the 2004 Summer Program in Geophysical Fluid Dynamics in Woods Hole, MA).

October 2000

NSF/DOE Partnership in Basic Plasma Science grant, “Transport in Chaotic Plasmas and Fluids.” Co-written with Allen H. Boozer (PI).

Association Memberships

American Physical Society (Division of Fluid Dynamics), Lifetime Member

Society for Industrial and Applied Mathematics (Activity Group on Dynamical Systems), Lifetime Member

Professional Activities

University-wide Committees

September 2012–June 2013

Graduate Faculty Executive Committee

September 2012–present

Physical Science Research Committee

External Committees and Other Professional Positions

September 2002–present

Faculty of the GFD Summer Program at the Woods Hole Oceanographic Institution.

The Faculty, consisting of about 25 members worldwide, is the governing body of the GFD Program, which has been running for nearly 50 years.

June 2014–June 2016

AMS Centennial Fellowship Committee.

January 2013–present

Education Committee, Society for Industrial and Applied Mathematics.

Schools and Meetings

Co-organizer, Workshop on *Lagrangian Coherent Structures*, Banff International Research Station, Alberta, Canada, September 2013. (Co-organized with Thomas Peacock and George Haller.)

Co-organizer, Workshop on *pseudo-Anosovs with small dilatation*, Madison, WI, 24–25 April 2010. (Co-organized with Jordan Ellenberg.)

Co-organizer, Minisymposium on *Slow Transport and Coherent Sets in Driven Flow*, SIAM Conference on Applications of Dynamical Systems, 17–21 May 2009. (Co-organized with Gary Froyland.)

Co-organizer, Minisymposium on *Mixing in Industry and the Environment*, International Congress on Industrial and Applied Mathematics (Jointly with SIAM general meeting), Zürich, Switzerland, 16–20 July 2007. (Co-organized with Emmanuel Villermaux.)

Co-organizer, Minisymposium on *Topology and Mixing in Fluids*, SIAM Conference on Applications of Dynamical Systems, 28 May–1 June 2007. (Co-organized with Mark Stremler.)

Organizer, *London Mathematical Society Meeting on Mixing and its Applications*, Imperial College London, 8 January 2004.

Editor

Special issue of *Communications in Nonlinear Sciences and Numerical Simulations*: Mathematical Structure of Fluids and Plasmas (co-editor)

Special issue of *Physica D: Fluid Dynamics: From Theory to Experiments* (co-editor)

Proceedings of the 2001 Summer Program in Geophysical Fluids Dynamics

Woods Hole Oceanographic Institution

Organizer: Neil J. Balmforth

Proceedings of the 2000 Summer Program in Geophysical Fluids Dynamics

Woods Hole Oceanographic Institution

Organizer: Richard Salmon

Proceedings of the 1999 Summer Program in Geophysical Fluids Dynamics

Woods Hole Oceanographic Institution

Organizer: Neil J. Balmforth

Proceedings of the 1998 Summer Program in Geophysical Fluids Dynamics

Woods Hole Oceanographic Institution

Organizer: Neil J. Balmforth

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