ANAND U. OZA

2 Washington Square Village, New York, NY 10012
oza@cims.nyu.edu / 510-709-8782

Research Interests

Physical applied mathematics: fluid mechanics, collective behavior, nonlinear dynamics, bifurcation theory, chaotic systems, soft active matter.

Employment

Postdoctoral Fellow, Courant Institute of Mathematical Sciences, New York Univ. (2014 – 2017)
Sponsor: Esteban G. Tabak
Supported by NSF Mathematical Sciences Postdoctoral Fellowship

Education

PhD, Mathematics
Massachusetts Institute of Technology (2014)
Thesis: "A trajectory equation for walking droplets: hydrodynamic pilot-wave theory."
Advisors: John W. M. Bush and Rodolfo R. Rosales
Supported by Graduate Fellowships from the NSF and Hertz Foundation

Master of Advanced Study (with Distinction), Applied Mathematics and Theoretical Physics
University of Cambridge (2009)
Essay: "Nonlocality beyond quantum theory"
Supported by Churchill Scholarship

Arts Bachelor (*summa cum laude*), Chemistry (minor: Applied & Computational Mathematics)
Princeton University (2008)
Thesis: "Analysis of optimization efficiency for the control landscapes of open quantum systems". (Advisor: Herschel Rabitz)

Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship	2014-2017
Hertz Foundation Graduate Fellowship	2009-2014
MIT Spot Award	2014
MIT Math nominee for CGS/ProQuest Distinguished Dissertation Award	2014
SIAM Conference travel award	2014
NSF Graduate Fellowship	2009-2012
MIT-Brazil travel grant	2011
Churchill Scholarship	2008-2009
Churchill College Prize (Cambridge)	2009
Elected to Phi Beta Kappa	2008
Applied Math Undergraduate Certificate Prize for thesis work (Princeton)	2008
Robert McCay Prize in Physical Chemistry (Princeton)	2008
New Jersey Institute of Chemists Student Award	2008

Applied Math Fellowship for Summer Research (Princeton)	2007
American Geophysical Union travel grant	2006
James R. Peterson Award for Excellence in Undergraduate Research (SRI)	2006
Shapiro Prize for Academic Excellence (Princeton)	2005

Other Academic and Scientific Positions

Mentor for undergraduate research student (Kirin Sinha, MIT UROP)	2013 - 2014
Mentor for undergraduate research student (Kristin Dettmers, MIT MSRP)	summer 2013
REU Intern, Molecular Physics Laboratory, SRI Intl. (mentor: K. Kalogerakis)	summer 2006
Research Intern, Rigel Pharmaceuticals	summer 2005

Publications

- Orbiting pairs of walking droplets.
  A. U. Oza, E. Siéfert, D. M. Harris, J. Moláček & J. W. M. Bush.
  Submitted, 2016.
- Flow interactions lead to orderly formations of flapping wings in forward flight.
  S. Ramananarivo, F. Fang*, A. U. Oza*, J. Zhang & L. Ristroph
  Physical Review Fluids (Rapid Communications), 1: 071201(R), 2016.
- The onset of chaos in orbital pilot-wave dynamics.
  L. Tambasco, D. M. Harris, A. U. Oza, R. R. Rosales & J. W. M. Bush
  Chaos, 26: 103107, 2016.
- Generalized Swift-Hohenberg models for dense active suspensions.
  A. U. Oza, S. Heidenreich & J. Dunkel
  European Physical Journal E, 39: 97, 2016.
- Antipolar ordering of topological defects in active liquid crystals.
  A. U. Oza & J. Dunkel
  New Journal of Physics, 18: 093006, 2016.
- Pilot-wave dynamics in a harmonic potential: quantization and stability of circular orbits.
  M. Labousse, A. U. Oza, S. Perrard & J. W. M. Bush
  Physical Review E, 93: 033122, 2016.
- The wave-induced added mass of walking droplets.
  J. W. M. Bush, A. U. Oza & J. Moláček
  Journal of Fluid Mechanics (Rapids), 755: R7, 2014.
- Pilot-wave hydrodynamics in a rotating frame: Exotic orbits.
  A. U. Oza, Ø. Wind-Willassen, D. M. Harris, R. R. Rosales & J. W. M. Bush
  Physics of Fluids, 26: 082101, 2014.
- Pilot-wave dynamics in a rotating frame: on the emergence of orbital quantization.
  A. U. Oza, D. M. Harris, R. R. Rosales & J. W. M. Bush
  Journal of Fluid Mechanics, 744: 404-429, 2014.
- A trajectory equation for walking droplets: hydrodynamic pilot-wave theory.
  A. U. Oza, R. R. Rosales & J. W. M. Bush
  Journal of Fluid Mechanics, 737: 552-570, 2013.
- Optimization search effort over the control landscapes for open quantum systems with Kraus-map evolution.
  A. U. Oza, A. Pechen, V. Beltrani, K. Moore & H. Rabitz
  Journal of Physics A (Mathematical and Theoretical), 42: 205305, 2009.

- The coating hypothesis for ammonia ice particles in Jupiter: laboratory experiments and optical modeling.
  K. S. Kalogerakis, J. Marschall, A. U. Oza, P. A. Engel, R. T. Meharchand & M. H. Wong
  Icarus, 196(1): 202-215, 2008.

Publications in preparation

- A coarse-grained model for interacting, flapping swimmers.
  A. U. Oza, L. G. Ristroph & M. J. Shelley

- Promenading pairs of walking droplets.
  J. A. Mugica, A. U. Oza and J. W. M. Bush

- Simulations of pilot-wave dynamics in a central force.
  K. M. Kurianski, A. U. Oza and J. W. M. Bush

Invited Talks

SIAM Conference on Applications of Dynamical Systems (Snowbird, UT)	May 2017
AMS Spring Southeastern Sectional Meeting (Charleston, SC)	Mar 2017
NJIT Fluids & Waves Seminar	Nov 2016
Harvard University Widely Applied Mathematics Seminar	Oct 2016
SIAM Conference on Nonlinear Waves and Coherent Structures (Philadelphia, PA)	Aug 2016
Geophysical Fluid Dynamics Summer School (Woods Hole, MA)	Jul 2016
UC Berkeley Fluids Seminar	Mar 2016
University of Bath Nonlinear Mechanics Seminar (Bath, UK)	Feb 2016
Oxford University Industrial & Applied Mathematics Seminar (Oxford, UK)	Feb 2016
TIFR Center for Interdisciplinary Sciences Seminar (Hyderabad, India)	Dec 2015
Frontiers in Applied and Computational Mathematics Conference (NJIT, USA)	June 2015
NJIT Fluids & Waves Seminar	Apr 2015
Fordham University Analysis Seminar	Apr 2015
Northeastern University Applied Math Seminar	Jan 2015
Northwestern University Engineering Sciences & Applied Math Seminar	Jan 2015
Courant Institute Applied Math Lab Seminar	Oct 2014
SIAM Conference on Nonlinear Waves and Coherent Structures (Cambridge, UK)	Aug 2014
Imperial College, Dept. of Mathematics (London, UK)	Jan 2014

Conference Presentations

APS DFD Meeting (Portland, USA)	Nov 2016
SIAM Annual Meeting (Boston, USA)	Jul 2016
APS DFD Meeting (Boston, USA)	Nov 2015
Hydrodynamic Quantum Analogues Workshop V (University of Calabria, Italy)	Jul 2015
Applied Math Days (Rensselaer Polytechnic Institute, USA)	Apr 2015
APS DFD Meeting (San Francisco, USA)	Nov 2014
Hydrodynamic Quantum Analogues Workshop IV (IMPA, Rio de Janeiro, Brazil)	June 2014
APS DFD Meeting (Pittsburg, USA)	Nov 2013
Hydrodynamic Quantum Analogues Workshop III (MIT, USA)	Sep 2013
Hertz Foundation Symposium (Maryland, USA)	Aug 2013

APS DFD Meeting (San Diego, USA)	Nov 2012
Hydrodynamic Quantum Analogues Workshop II (Université Paris VII, France)	Jul 2012
Complex Motion in Fluids (Krogerup Højskole, Denmark)	Aug 2011
Hydrodynamic Quantum Analogues Workshop I (Université Paris VII, France)	Jul 2011
American Geophysical Union Fall Meeting (San Francisco, USA)	Dec 2006

Teaching Experience

Course instructor, Calculus II (Courant Institute)	fall 2016
Course instructor, Calculus II (Courant Institute)	spring 2016
Course instructor, Calculus II (Courant Institute)	fall 2015
Course instructor, Computational science and engineering I (MIT)	summer 2014
Recitation instructor, Complex variables with applications (MIT)	spring 2013
Instructor: Chemistry, Algebra II, Precalculus (ThinkTank Learning, CA)	summer 2008-09
Tutor for Freshman Scholars Institute, Calculus (Princeton)	summer 2007
Academic tutor: chemistry and mathematics (Princeton High School)	2004 - 2006

Research projects supervised or mentored

- Likhit Ganedi (undergraduate, NYU) — Dec 2015 - present
  Free streamline theory for flow past a soap film
- Juncal Arbelaiz Mugica (masters, visiting MIT) — Nov 2015 - present
  Modeling the promenade mode in interacting walking droplets
- Emmanuel Siéfert (masters, visiting MIT) — June 2015 – Feb 2016
  Modeling orbiting pairs of walking droplets
- Kristin Kurianski (undergraduate summer program, MIT) — summer 2013
  Orbital stability of walking droplets in a Coulomb potential
- Kirin Sinha (undergraduate research program, MIT) — 2013 - 2014
  Orbital stability of walking droplets in a rotating frame

Service and Outreach

- Organize Applied Math Lab Seminar, Courant Institute, NYU — Sep 2015 - present
- CSplash, Courant Institute, NYU — Apr 2016
  Gave a talk at free lecture series for local high school students.
- MIT Explore — Apr 2013
  Volunteered at math activities event for elementary school students.
- MIT Mathematics Department Retreat — Oct 2012
  On organizing committee for first annual department retreat.

References

- John W. M. Bush
  Professor of Applied Mathematics, Massachusetts Institute of Technology
  77 Massachusetts Avenue, Room 2-446, Cambridge, MA 02139
  bush@math.mit.edu

- Michael Shelley
  Professor of Mathematics, Courant Institute of Mathematical Sciences, NYU
  251 Mercer Street, Room 1102, New York, NY 10012
  shelley@cims.nyu.edu

- Jörn Dunkel
  Assistant Professor of Applied Mathematics, Massachusetts Institute of Technology
  77 Massachusetts Avenue, Room 2-381, Cambridge, MA 02139
  dunkel@math.mit.edu

- Rodolfo R. Rosales
  Professor of Applied Mathematics, Massachusetts Institute of Technology
  77 Massachusetts Avenue, Room 2-337, Cambridge, MA 02139
  rrr@math.mit.edu

- Elizabeth Stepp (Teaching reference)
  Lecturer, City University of New York, Baruch College
  One Bernard Baruch Way, Room 6-289, New York, NY 10010
  elizabeth.stepp@baruch.cuny.edu