

Daniel M. Harris

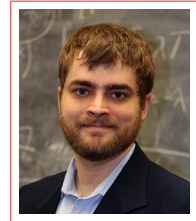
Curriculum Vitae

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📁 brown.edu/research/labs/harris



Research Interests

Fluid Mechanics, Interfacial Phenomena, Microfluidics, Nonlinear Systems.

Education

2010–2015 **Ph.D., Mathematics**, *Massachusetts Institute of Technology*.

Focus in Physical Applied Mathematics.

Thesis Title: The pilot-wave dynamics of walking droplets in confinement.

Advisor: John W. M. Bush.

2006–2010 **B.S., Mechanical Engineering**, *Cornell University*.

Concentration in Thermo-Fluids Engineering, Minor in Applied Mathematics.

Research Advisor: Charles H. K. Williamson.

Professional Positions

2017–Present **Assistant Professor of Engineering**, *Brown University*.

School of Engineering, Fluids and Thermal Sciences (FTS) Group.

2015–2017 **Postdoctoral Research Associate**, *University of North Carolina at Chapel Hill*.

Department of Mathematics, Joint Applied Math and Marine Sciences Fluids Lab.

Supervisors: Roberto Camassa and Richard M. McLaughlin.

Honors and Awards

2016 Expert's Choice Winner in NSF/Popular Science Visualization Challenge.

2015 Winner of American Physical Society Gallery of Fluid Motion (3 awards).

2015 Housman Award for Excellence in Teaching at MIT.

2012 Winner of American Physical Society Gallery of Fluid Motion.

2011 National Science Foundation Graduate Research Fellowship.

2010 NASA Aeronautics Graduate Scholarship.

2010 Cornell Engineering Learning Initiatives Research Award.

2009 Winner of American Physical Society Gallery of Fluid Motion.

2009 Finalist in National Science Foundation Visualization Challenge.

2009 New York/NASA Space Grant Fellowship.

Manuscripts in Preparation or Under Review

- [1] A Halev and DM Harris. Bouncing ball on a vibrating periodic surface. *Under review*.
- [2] M DiSalvo, DM Harris, S Kantesaria, AN Pena, JD Allbritton-King, JH Cole, and NL Allbritton. Characterization of tensioned PDMS membranes for imaging cytometry on microarray arrays. *Under review*.

Publications

- [1] Manuchehr Aminian, Francesca Bernardi, Roberto Camassa, Daniel M Harris, and Richard M McLaughlin. The diffusion of passive tracers in laminar shear flow. *Journal of Visualized Experiments*, in press.
- [2] Giuseppe Pucci, Daniel M. Harris, Luiz M. Faria, and John W. M. Bush. Walking droplets interacting with single and double slits. *Journal of Fluid Mechanics*, 835:1136–1156, 2018.
- [3] Anand U Oza, Emmanuel Siéfert, Daniel M Harris, Jan Moláček, and John WM Bush. Orbiting pairs of walking droplets: Dynamics and stability. *Physical Review Fluids*, 2(5):053601, 2017.
- [4] Daniel M Harris, Julio Quintela, Victor Prost, P-T Brun, and John WM Bush. Visualization of hydrodynamic pilot-wave phenomena. *Journal of Visualization*, 20(1):13–15, 2017.
- [5] Manuchehr Aminian, Francesca Bernardi, Roberto Camassa, Daniel M Harris, and Richard M McLaughlin. How boundaries shape chemical delivery in microfluidics. *Science*, 354(6317):1252–1256, 2016.
- [6] Lucas D Tambasco, Daniel M Harris, Anand U Oza, Rodolfo R Rosales, and John WM Bush. The onset of chaos in orbital pilot-wave dynamics. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 26(10):103107, 2016.
- [7] Adam P Damiano, P-T Brun, Daniel M Harris, Carlos A Galeano-Rios, and John WM Bush. Surface topography measurements of the bouncing droplet experiment. *Experiments in Fluids*, 57(10):163, 2016.
- [8] P-T Brun, Daniel M Harris, Victor Prost, Julio Quintela, and John WM Bush. Shedding light on pilot-wave phenomena. *Physical Review Fluids*, 1(5):050510, 2016.
- [9] Roberto Camassa, Daniel M Harris, David Holz, Richard M McLaughlin, Keith Mertens, Pierre-Yves Passaglia, and Claudio Viotti. Variable density vortex ring dynamics in sharply stratified ambient fluids. *Physical Review Fluids*, 1(5):050503, 2016.
- [10] Daniel M Harris, Giuseppe Pucci, Victor Prost, Julio Quintela Casal, and John WM Bush. Merger of a bubble and a soap film. *Physical Review Fluids*, 1(5):050505, 2016.
- [11] Brendan G McBennett and Daniel M Harris. Horizontal stability of a bouncing ball. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 26(9):093105, 2016.
- [12] Giuseppe Pucci, Daniel M Harris, and John WM Bush. Partial coalescence of soap bubbles. *Physics of Fluids*, 27(6):061704, 2015.

- [13] Daniel M Harris, Tanya Liu, and John WM Bush. A low-cost, precise piezoelectric droplet-on-demand generator. *Experiments in Fluids*, 56(4):83, 2015.
- [14] Daniel M Harris and John WM Bush. Generating uniaxial vibration with an electrodynamic shaker and external air bearing. *Journal of Sound and Vibration*, 334:255–269, 2015.
- [15] Charles HK Williamson, Thomas Leweke, Daniel J Asselin, and Daniel M Harris. Phenomena, dynamics and instabilities of vortex pairs. *Fluid Dynamics Research*, 46(6):061425, 2014.
- [16] Anand U Oza, Øistein Wind-Willassen, Daniel M Harris, Rodolfo R Rosales, and John WM Bush. Pilot-wave hydrodynamics in a rotating frame: Exotic orbits. *Physics of Fluids*, 26(8):082101, 2014.
- [17] Anand U Oza, Daniel M Harris, Rodolfo R Rosales, and John WM Bush. Pilot-wave dynamics in a rotating frame: on the emergence of orbital quantization. *Journal of Fluid Mechanics*, 744:404–429, 2014.
- [18] Daniel M Harris and John WM Bush. Droplets walking in a rotating frame: from quantized orbits to multimodal statistics. *Journal of Fluid Mechanics*, 739:444–464, 2014.
- [19] Daniel M Harris, Julien Moukhtar, Emmanuel Fort, Yves Couder, and John WM Bush. Wavelike statistics from pilot-wave dynamics in a circular corral. *Physical Review E*, 88(1):011001, 2013.
- [20] Daniel M Harris and John WM Bush. The pilot-wave dynamics of walking droplets. *Physics of Fluids*, 25(9):091112, 2013.
- [21] Øistein Wind-Willassen, Jan Moláček, Daniel M Harris, and John WM Bush. Exotic states of bouncing and walking droplets. *Physics of Fluids*, 25(8):082002, 2013.
- [22] Daniel M Harris and Charles HK Williamson. Instability of secondary vortices generated by a vortex pair in ground effect. *Journal of Fluid Mechanics*, 700:148–186, 2012.
- [23] Daniel M Harris, Victor A Miller, and Charles HK Williamson. A short wave instability caused by the approach of a vortex pair to a ground plane. *Physics of Fluids*, 22(9):091106, 2010.
- [24] Victor A Miller, Daniel M Harris, and Charles HK Williamson. Briefing: Interaction of a counter-rotating vortex pair with the ground. *Proceedings of the Institution of Civil Engineers-Engineering and Computational Mechanics*, 162(4):181–183, 2009.

Invited Presentations

Follow the Bouncing Ball.

- Applied Math Colloquium, Carolina Center for Interdisciplinary Applied Mathematics.
 - *University of North Carolina at Chapel Hill*, Chapel Hill, NC (January 2018).

Digital and Continuous Microfluidics.

- Mechanical and Industrial Engineering Seminar, College of Engineering.
 - *New Jersey Institute of Technology*, Newark, NJ (March 2017).
- Mechanical & Aerospace Engineering Seminar, School of Engineering and Applied Science.
 - *University of Virginia*, Charlottesville, VA (March 2017).
- Fluids and Thermal Sciences Seminar, School of Engineering.
 - *Brown University*, Providence, RI (February 2017).
- Engineering Science and Mechanics Seminar, College of Engineering.
 - *Pennsylvania State University*, State College, PA (February 2017).

Taylor Dispersion and Microfluidics.

- Physical Mathematics Seminar, Department of Mathematics.
 - *Massachusetts Institute of Technology*, Cambridge, MA (November 2016).
- Differential Equations Seminar, Department of Mathematics.
 - *North Carolina State University*, Raleigh, NC (October 2016).
- Graduate Mathematics Association (GMA) Seminar, Department of Mathematics.
 - *University of North Carolina at Chapel Hill*, Chapel Hill, NC (September 2016).

Bouncing and Walking Droplets.

- Graduate Mathematics Association (GMA) Seminar, Department of Mathematics.
 - *University of North Carolina at Chapel Hill*, Chapel Hill, NC (March 2016).
- Complex Matter and Biophysics Seminar, Department of Physics.
 - *North Carolina State University*, Raleigh, NC (October 2015).
- Joint Applied Math/Applied Physical Sciences Seminar, College of Arts and Sciences.
 - *University of North Carolina at Chapel Hill*, Chapel Hill, NC (February 2015).

Contributed Presentations

- [1] DM Harris, J Edmonds, CA Galeano-Rios, and PA Milewski. "Impact of a hydrophobic sphere onto a bath." APS-DFD Meeting 2017, Denver, CO.
- [2] DM Harris, M Aminian, F Bernardi, R Camassa, and RM McLaughlin. "Tailoring tails in Taylor dispersion: how boundaries shape chemical delivery in microfluidics: experiments." APS-DFD Meeting 2016, Portland, OR.
- [3] DM Harris, AU Oza, RR Rosales, and JWM Bush. "Pilot-wave hydrodynamics in a rotating frame." SIAM Southeastern Atlantic Section Conference 2016, Athens, GA.
- [4] DM Harris, G Pucci, and JWM Bush. "Partial coalescence of soap bubbles." APS-DFD Meeting 2015, Boston, MA.
- [5] DM Harris, G Pucci, and JWM Bush. "Diffraction of walking droplets." APS-DFD Meeting 2014, San Francisco, CA.
- [6] DM Harris and JWM Bush. "Droplets walking in a rotating frame: from quantized orbits to wavelike statistics." APS-DFD Meeting 2013, Pittsburgh, PA.
- [7] DM Harris and JWM Bush. "Pilot-wave dynamics in confined geometries." APS-DFD Meeting 2012, San Diego, CA.
- [8] DM Harris and CHK Williamson. "A shortwave instability caused by the approach of a vortex pair to a ground plane." APS-DFD Meeting 2010, Long Beach, CA.

Funding

- 2018–2019 Brown OVPR Seed Award: “Making an Impact: Dynamic Free-Surface Interactions.”
◦ Award amount: \$50,000.

Teaching Experience

- Spring 2018 Vibration of Mechanical Systems (ENGN 2911N), Course Instructor, *Brown*.
Fall 2017 Fluid Mechanics I (ENGN 2810), Course Instructor, *Brown*.
Summer 2017 Undergraduate Seminar in Math (MATH 294), Asst. Course Instructor, *UNC-CH*.
Summer 2017 Math Methods for the Physical Sciences I (MATH 528), Course Instructor, *UNC-CH*.
Spring 2017 Math Methods for the Physical Sciences II (MATH 529), Course Instructor, *UNC-CH*.
Fall 2016 Math Methods for the Physical Sciences I (MATH 528), Course Instructor, *UNC-CH*.
Spring 2016 Math Methods for the Physical Sciences II (MATH 529), Course Instructor, *UNC-CH*.
Fall 2015 Math Methods for the Physical Sciences I (MATH 528), Course Instructor, *UNC-CH*.
Summer 2015 Computational Science and Engineering I (18.085), Course Co-Instructor, *MIT*.
Winter 2015 Calculus (18.02A), Recitation Instructor and Course Administrator, *MIT*.
Fall 2014 Calculus (18.01A), Recitation Instructor and Course Administrator, *MIT*.
Fall 2013 Linear Algebra (18.06), Recitation Instructor, *MIT*.

Professional Service Activities

Meeting Organizer.

- 8th Meeting on Hydrodynamic Quantum Analogs (2018), *Brown University*.

Journal Peer Review.

- *Physics of Fluids*.
◦ *Fluid Dynamics Research*.

Conference Session Chair.

- APS-DFD (2017) – Q20: *Free Surface Flows: Fluid-Solid Interactions*.

2017–Present **Engineering Project Team Co-Advisor.**

- Brown Formula Racing (Formula SAE), *Brown University*.

Professional Society Memberships

2010–Present **American Physical Society.**

- Division of Fluid Dynamics.

2007–2010 **Society of Automotive Engineers.**

Outreach Activities

- 2017 Speaker for Girls Talk Math Program, *UNC-CH*.
2017 Exhibit designer for Arts Everywhere Day, *UNC-CH*.
2016 Volunteer for Science Expo, *UNC-CH*.
2016 Speaker for Undergraduate Society of Physics Students, *UNC-CH*.
2015 Panelist at Career Symposium for Graduate and Postdoctoral Scholars, *UNC-CH*.