

# Daniel M. Harris

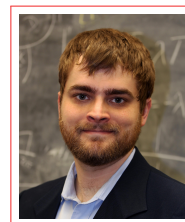
## Curriculum Vitae

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🏠 [brown.edu/research/labs/harris](http://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.

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## Manuscripts in Preparation or Under Review

- [1] A Halev and DM Harris. Bouncing ball on vibrating periodic surface. *In preparation*, 2017.
- [2] M DiSalvo, DM Harris, S Kantesaria, AN Pena, J Cole, and NL Allbritton. Physical deformation modeling of PDMS membranes for cell sorting on micraoft arrays. *In preparation*, 2017.
- [3] M Aminian, F Bernardi, R Camassa, DM Harris, and RM McLaughlin. Experimental procedure for the diffusion of passive tracers in laminar shear flow. *Under review*, 2017.
- [4] G Pucci, DM Harris, LM Faria, and JWM Bush (2017). Walking droplets passing through single- and double-slits. *Under review*, 2017.

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## Publications

- [1] 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.
- [2] 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.
- [3] 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] Roberto Camassa, Daniel M Harris, David Holz, Richard M McLaughlin, Keith Mertens, Pierre-Yves Passaggia, and Claudio Viotti. Variable density vortex ring dynamics in sharply stratified ambient fluids. *Physical Review Fluids*, 1(5):050503, 2016.
- [8] 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.
- [9] Brendan G McBennett and Daniel M Harris. Horizontal stability of a bouncing ball. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 26(9):093105, 2016.

- [10] Giuseppe Pucci, Daniel M Harris, and John WM Bush. Partial coalescence of soap bubbles. *Physics of Fluids*, 27(6):061704, 2015.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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.
- [16] 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.
- [17] 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.
- [18] Daniel M Harris and John WM Bush. The pilot-wave dynamics of walking droplets. *Physics of Fluids*, 25(9):091112, 2013.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] 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.

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## Invited Presentations

### 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).

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## Contributed Presentations

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

## Teaching Experience

- Fall 2017 Fluid Mechanics I (ENGN 2810), Course Instructor, *Brown University*.
- Summer 2017 Seminar in Mathematics (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

### Journal Peer Review.

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

## 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*.