MICHAEL ALLSHOUSE

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RESEARCH INTERESTS : Stratified Flows; Nonlinear Dynamics; Numerical Methods

EMPLOYMENT

2016-present	Assistant Professor, Northeastern University, Boston, MA.
2013-2016	Postdoctoral Fellow, University of Texas at Austin, Austin, TX.
2008-2013	Research Assistant, Massachusetts Institute of Technology, Cambridge, MA.

EDUCATION

Ph. D.	Department of Mechanical Engineering, MIT, Cambridge, MA, 9/2013. GPA 4.9/5.0
M. Sc.	Department of Mechanical Engineering, MIT, Cambridge, MA, 6/2010. GPA 4.9/5.0
B. Sc.	Department of Mechanical Engineering, MIT, Cambridge, MA, 6/2008. GPA 4.8/5.0

HONORS & AWARDS

2016	Visualizing Science 2016 (University of Texas)
2012	Den Hartog Travel Award in Mechanics
2012	Martin A. Abkowitz Travel Award
2011	NSF Travel Award
2010	WHOI Geophysical Fluid Dynamics Fellow
2009	NSF International Travel Award
2008	MIT Pappalardo Graduate Research Fellowship

JOURNAL PUBLICATIONS

8. **M.R. Allshouse**, G.N. Ivey, J. Xu, C.J. Beegle-Krause, R.J. Lowe, N.L. Jones, and T. Peacock, "The impact of wind on the hidden structure of ocean surface transport," to appear in Environ Fluid Mech (2017).
7. **M.R. Allshouse**, F. Lee, P. J. Morrison, and H. L. Swinney, "Experimental determination of radiated internal wave power from synthetic schlieren data," Phys. Rev. Fluids, 1, 014301 (2016).
6. **M.R. Allshouse** and T. Peacock, "Lagrangian based methods for coherent structure detection," Chaos, 25, 097617 (2015). *Invited article in "THE 25TH ANNIVERSARY OF CHAOS: PERSPECTIVES ON NONLINEAR SCIENCEPAST, PRESENT, AND FUTURE" focus issue*
5. **M.R. Allshouse** and T. Peacock, "Refining finite-time Lyapunov exponent ridges and the challenges of classifying them," Chaos, 25, 087410 (2015). *Invited article in "OBJECTIVE DETECTION OF COHERENT STRUCTURES" focus issue*
4. M. Mercier, A. Ardekani, **M.R. Allshouse**, B. Doyle, and T. Peacock, "Self-Propulsion of Immersed Objects via Natural Convection," Phys. Rev. Let., 112, 204501 (2014).
3. D. Kelley, **M.R. Allshouse**, and N. Ouellette, "Lagrangian coherent structures separate dynamically distinct regions in fluid flows," Phys. Rev. E, 88, 013017 (2013).
2. **M.R. Allshouse** and J-L. Thiffeault, "Detecting coherent structures using braids," Physica D, 241, 95-105 (2012).
1. **M.R. Allshouse**, M.F. Barad, and T. Peacock, "Propulsion generated by diffusion-driven flow", Nature Physics, 6, 516-519 (2010).

CONFERENCE PUBLICATIONS

3. CJ Beegle-Krause, T. Peacock and **M.R. Allshouse** "Lagrangian Coherent Structures (LCS) for the Calculation of Oil Spill and Search-and-Rescue Drift Patterns in the Ocean," to appear in the Proceedings of the 34^{th} annual Arctic and Marine Oil Pollution Conference, Banff, Alberta, Canada, October 4-6, 2011.
2. **M.R. Allshouse** and T. Peacock "Layering and Propulsion through Diffusion-Driven Flow," to appear in the Proceedings of the International Conference on Fluxes and Structures in Fluids: Physics of Geospheres, Moscow, Russia June 24-27, 2009.
1. **M.R. Allshouse** and N.G. Hadjiconstantinou, "Low-Variance Deviational Monte Carlo Simulations of Pressure-Driven Flow in Micro- and Nanoscale Channels," to appear in the Proceedings of the 26^{th} International Symposium on Rarefied Gas Dynamics, Kyoto, Japan, July 21-25, 2008.

CONFERENCE PRESENTATIONS

15. "Application of fuzzy c-mean trajectory clustering to internal wave bolus detection," BIRS Meeting: Transport in Unsteady Flows: from Deterministic Structures to Stochastic Models and Back Again, Banff, Canada, January 2017.
14. "Effect of pycnocline thickness on internal wave bolus transport," APS Division of Fluid Dynamics 69th Annual Meeting, Portland, Oregon, November 2016.
13. "Lagrangian clustering detection of internal wave boluses," Ocean Sciences Meeting, New Orleans, Louisiana, February 2016.
12. "Internal wave bolus detection and analysis by a Lagrangian coherent structure method," APS Division of Fluid Dynamics 68th Annual Meeting, Boston, Massachusetts, November 2015.
11. " Shoaling Large Amplitude Internal Solitary Waves in a Laboratory Tank," APS Division of Fluid Dynamics 67th Annual Meeting, San Francisco, California, November 2014.
10. "Accounting for windage in the identification and classification of FTLE ridges," BIRS Meeting: Uncovering Transport Barriers in Geophysical Flows, Banff, Canada, September 2013.
9. "A New, Braid-Theoretic Approach to Uncovering Transport Barriers," SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2013.
8. "Efficient and robust detection of transport barriers using the geodesic approach," APS Division of Fluid Dynamics 65nd Annual Meeting, San Diego, California, November 2012.
7. "Dynamically Distinct Decomposition via Braid Theory," Topological Fluid Dynamics (IUTAM Symposium), Cambridge, England, July 2012.
6. "Transport Barrier detection via braid theory," The 9th AIMS Conference on Dynamical Systems, Differential Equations and Application, Orlando, Florida, July 2012.
5. "Application of braid theory to Lagrangian Coherent Structures," Coherent Structures in Dynamical Systems, Lorentz Center, Leiden, Netherlands, May 2009.
4. "Finding Lagrangian Structures via the application of braid theory," Woods Hole Oceanographic Institute GFD Summer School, Woods Hole, Massachusetts, August 2010.
3. "A novel way to measure molecular diffusivity," oral presentation, APS Division of Fluid Dynamics 62nd Annual Meeting, Minneapolis November 2009.
2. "Diffusion-driven propulsion," oral presentation, International Conference on Fluxes and Structures in Fluids: Physics of Geospheres, Moscow, Russia, June 2009.
1. "Diffusion-driven layering," oral presentation, APS Division of Fluid Dynamics 60th Annual Meeting, Salt Lake City, November 2007.

INVITED PRESENTATIONS

5. "Lagrangian Coherent Structures and Oceanic Transport," Department of Civil Engineering, University of Houston, March 2016.
4. "Lagrangian Coherent Structures and Oceanic Transport," Department of Civil Engineering and Engineering Mechanics, Columbia University, March 2016.
3. "Lagrangian Coherent Structures and Oceanic Transport," Department of Civil Engineering, Duke University, February 2016.
2. "Lagrangian Coherent Structures and Oceanic Transport," Department of Mechanical and Industrial Engineering, Northeastern University, February 2016.
1. "Diffusion Driven Flow," Center for Nonlinear Dynamics Seminar, Department of Physics, University of Texas at Austin, March 2013.

TEACHING EXPERIENCE

ME 7310	Professor for the graduate course ME7310 (Spring 2017). This course covers the basics of computational fluid dynamics (CFD). Provided bi-weekly lectures, homeworks, exam and term projects for the students.
Nonlinear Dynamics	Teaching assistant for the undergraduate course 2.050J *Nonlinear Dynamics I: Chaos* (Fall 2009, Fall 2011). Held office hours, developed homework sets and exams, and gave multiple lectures in absence of Professor.
Dynamics	Teaching assistant for the undergraduate course 2.003J *Dynamics and Controls I* (Fall 2010). Held office hours, developed homework sets and exams, and gave review sessions.
Vietnam LCS School	(2012) Helped develop and conduct a one week workshop program describing what Lagrangian Coherent Structures are and how to calculate them.
Hands on research school	(2015) Assistant instructor at the international school held at ICTP focusing on teaching table top experimental techniques to researchers from developing nations.
Math tutoring	(2013-2016) Volunteered with APIE . Weekly tutoring with under privileged 8th graders at Dobie Middle school. Worked in small groups on established curriculum to improve standardized test scores.

MEMBERSHIPS

American Physics Society, American Society of Mechanical Engineers, Society of Industrial and Applied Mathematicians