

# Jesse T. Ault

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Mechanical and Aerospace Engineering  
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## Education

- **Ph.D., Mechanical and Aerospace Engineering**  
*Princeton University, Expected June 2017*
  - Thesis: Vortex Dynamics in Swirling Flows with Applications to Energy and Biology
  - Advisor: Howard A. Stone
  - Graduate certificate in Computational and Information Science
- **M.A., Mechanical and Aerospace Engineering**  
*Princeton University, September 2014*
- **B.S.M.E., Mechanical Engineering with Math and Physics minors, University Honors Program**  
*Purdue University, June 2012*

## Awards

- **Harold W. Dodds Honoric Fellowship** - Awarded to senior graduate students “displaying the highest scholarly excellence in graduate work” at Princeton University (2016).
- **Best Presentation Award** - MAE Research Day Competition, Princeton University (2016).
- **Mary and Randall Hack ‘69 Graduate Award** - Awarded by the Princeton Environmental Institute to support innovative research on water-related research with implications for the environment (2015).
- **Excellence in Teaching Award** - Awarded by the Princeton Engineering Council and Graduate Engineering Council on behalf of the students in MAE 335 (2014).
- **Crocco Award for Teaching Excellence** - Awarded by the Faculty of the MAE Department in recognition of outstanding performance as an Assistant in Instruction for MAE 222 (2014).
- **Gordon Y. S. Wu Fellowship** - “Princeton’s most prestigious award for graduate study in engineering” for incoming graduate students (2012).
- **Larry L. & Mary Alice McDonald Scholarship**, Purdue University (2011)
- **Arcelor Mittal Industrial Roundtable Scholarship**, Purdue University (2010)
- **Stephen D., Yvonne D., and Robert D. Miles Memorial Mechanical Engineering Scholarship**, Purdue University (2009)
- **John McClean Memorial Fund Scholarship**, Purdue University (2008)
- **Purdue Trustees Scholarship** (2008 - 2012)

## Publications

1. **Ault, J. T., Rallabandi, B., Shardt, O., Chen, K. K., and Stone, H. A. Entry and exit flows in curved pipes.** *Accepted for publication in J. Fluid Mech.*

2. Chen, T.-H., **Ault, J. T.**, Stone, H. A., and Arnold, C. B. **High-speed three-dimensional wide-field microscopy for volumetric particle tracking velocimetry.** *Accepted for publication in Exp. Fluids.*
3. **Ault, J. T.**, Fani, A., Chen, K. K., Shin, S., Gallaire, F., and Stone, H. A. **Vortex-breakdown-induced particle capture in branching junctions.** *Phys. Rev. Lett.* (2016), vol. 117, no. 8, pp. 1–5.
4. Feng, J., Muradoglu, M. Kim, H., **Ault, J. T.**, and Stone, H. A. **Dynamics of a bubble bouncing at a liquid/liquid/gas interface.** *J. Fluid Mech.* (2016), vol. 807, pp. 324–352.
5. Mensire, R., **Ault, J. T.**, Lorenceau, E., and Stone, H. A. **Point-source imbibition into dry aqueous foams.** *EPL (Europhys. Lett.).* (2016), vol. 113, no. 4, pp. 44002.
6. Shin, S., Um, E., Sabass, B., **Ault, J. T.**, Rahimi, M., Warren, P. B., and Stone, H. A. **Size-dependent control of colloid transport via solute gradients in dead-end channels.** *Proc. Natl. Acad. Sci. U.S.A.* (2016), vol. 113, no. 2, pp. 257–261.
7. **Ault, J. T.**, Chen, K. K., and Stone, H. A. **Downstream decay of fully developed Dean flow.** *J. Fluid Mech.* (2015), vol. 777, pp. 219–244.
8. Shin, S.\* , **Ault, J. T.\***, and Stone, H. A. **Flow-driven rapid vesicle fusion via vortex trapping.** *Langmuir* (2015), vol. 31, pp. 7178–7182. \*The authors contributed equally to this work.
9. Marine, N. A., Wheat, P. M., **Ault, J. T.**, and Posner, J. D. **Diffusive behaviors of circle-swimming motors.** *Phys. Rev. E.* (2013), 87(5), 052305.

## Publications (Under Review/In Revision)

1. Shin, S., **Ault, J. T.**, Feng, J., Warren, P. B., and Stone, H. A. **Zeta potentiometry using solute gradients.** *Under review for publication in Nature Materials.*

## Publications (In Preparation)

1. **Ault, J. T.**, Rallabandi, B., and Stone, H. A. **Axial decay of perturbed steady-state pipe flows.** *In preparation.*
2. **Ault, J. T.**, Shin, S., Warren, P. B., and Stone, H. A. **Note on the motion of particles under 1D solute gradients.** *In preparation.*
3. Shin, S., **Ault, J. T.**, and Stone, H. A. **Influence of water absorption on the viscosity of glycerol.** *In preparation.*
4. **Ault, J. T.**, Rallabandi, B., and Stone, H. A. **Finite length effects of sliding rods near solid boundaries.** *In preparation.*

## Teaching Experience

- **Teagle Teaching Seminar:** Year-long collaboration between graduate students and faculty to engage current research in teaching and learning in higher education, Princeton University, McGraw Center for Teaching and Learning (2014-2015)
- **Mechanics of Fluids: MAE 222,** Assistant in instruction (Spring 2014, Spring 2016)
  - Received Crocco Award for Teaching Excellence
- **Simulation and Modeling of Fluid Flows: MAE 557,** Assistant in instruction (Fall 2015)
- **Aircraft Design: MAE 332,** Assistant in instruction (Spring 2015)

- **Fluid Dynamics: MAE 335**, Assistant in instruction (Fall 2014)
  - Received Excellence in Teaching Award
- **Average Student Rating: 4.7/5.0**
- **Select Student Comments:**
  - “He is one of the best preceptors I’ve ever had. He goes out of his way to help students and brings clarity where there might be confusion.”
  - “He is always willing to meet and help, even outside of office hours.”
  - “He cares a lot about the class and the students.”
  - “He is an extremely dedicated preceptor, always going above and beyond for his students.”
- **Undergraduate student advising:**
  - **Dawn Wang:** Vortex-breakdown in Y-, T-, and arrow-shaped junctions.
  - **John Davis:** Growth and decay of fully developed Dean flow.
  - **Kevin Lee:** Enhancement of solar still productivity using thin-film, continuous flows.
  - **Sarah Battat:** Diffusiophoretic particle motions in dead-end pores.
  - **Andre Douglas:** Particle capture in swirling flows.

## Funded Grant Proposals

1. **Ault, J. T.** and Stone, H. A. Large-surface-area continuous-flow evaporative water purification, 2015. Princeton Environmental Institute.

## Invention Disclosures

1. **Zeta potentiometry using solute gradients.** Invention disclosure at Princeton University with H. A. Stone and S. Shin (2017).
2. **A method for producing large lipid vesicles.** Invention disclosure at Princeton University with H. A. Stone and S. Shin (2015).

## Invited Talks

1. Harvard University, Department of Applied Mathematics (Jan. 2017).
2. University of North Texas, Department of Mechanical and Energy Engineering (Jan. 2017).
3. Princeton University, Department of Mechanical and Aerospace Engineering (Sept. 2016).

## Conference Presentations

1. **Ault, J. T.**, Shin, S., and Stone, H. A. **Vortex breakdown in simple pipe bends.** In *American Physical Society 69th Annual Meeting of the Division of Fluid Dynamics*, Portland, OR, USA, November 2016.
2. Vigolo, D., Riccomi, M., Alberini, F., Brunazzi, E., **Ault, J. T.**, and Stone, H. A. **Flow visualization of the trapping induced by vortex breakdown at a junction.** In *American Physical Society 69th Annual Meeting of the Division of Fluid Dynamics*, Portland, OR, USA, November 2016.
3. Mensire, R., **Ault, J. T.**, Piroird, K., Stone, H. A., and Lorenceau, E. **Imbibition of dry aqueous foams by oil.** In *24th International Congress of Theoretical and Applied Mechanics*, Montreal, Canada, August 2016.

4. Chen, T. H., **Ault, J. T.**, and Arnold, C. B. **Volumetric real-time wide-field microscopy with tunable acoustic gradient lens.** In *SPIE Photonics West*, San Francisco, CA, USA, February 2016.
5. **Ault, J. T.**, Chen, K. K., and Stone, H. A. **Asymptotic scalings of developing curved pipe flow.** In *American Physical Society 68th Annual Meeting of the Division of Fluid Dynamics*, Boston, MA, USA, November 2015.
6. Chen, T. H., **Ault, J. T.**, and Arnold, C. B. **Volumetric real-time wide field microscopy with tunable acoustic lens: a new tool for micro PIV.** In *American Physical Society 68th Annual Meeting of the Division of Fluid Dynamics*, Boston, MA, USA, November 2015.
7. **Ault, J. T.**, Vigolo, D., Radl, S., and Stone, H. A. **Critical Reynolds Numbers for Particle Capture in Y-, T-, and Arrow-Shaped Junctions.** In *American Physical Society 67th Annual Meeting of the Division of Fluid Dynamics*, San Francisco, CA, USA, November 2014.
8. **Ault, J. T.**, Davis, J., and Stone, H. A. **Development and Decay Lengths of Fully-Developed Curved Pipe Flow.** In *American Physical Society 66th Annual Meeting of the Division of Fluid Dynamics*, Pittsburgh, PA, USA, November 2013.