CURRICULUM VITAE

Clara O'Farrell

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EDUCATION

2013 PhD in Control and Dynamical Systems
California Institute of Technology, Pasadena CA
Minor in Aeronautics
Thesis: *A Dynamical Systems Analysis of Vortex Pinch-Off*
Adviser: John O. Dabiri

2008 B.S.E. *summa cum laude* **in Mechanical and Aerospace Engineering**
Princeton University, Princeton NJ
Certificate in Applications of Computing
Thesis: *Chasing Hairpin Packets and their Wall Signature in Turbulent Boundary Layers*
Adviser: M. Pino Martín

RESEARCH EXPERIENCE

- **Guidance and Control Engineer**, Jet Propulsion Laboratory, Pasadena CA (2013-*present*)
  - Dynamics and trajectory modeling and simulation for entry, descent, and landing
  - Modeling parachute aerodynamics and parachute system flight dynamics for planetary exploration missions
- **Research Assistant**, California Institute of Technology, Pasadena CA (2009-2013)
  - Vortex dynamics and vortex formation in biological propulsion
  - Applications of Lagrangian Coherent Structures (LCS) to problems in biological flows
  - Adviser: John O. Dabiri
- **Research Assistant**, Princeton University, Princeton NJ (2007-2008)
  - Algorithms and tools for identifying and tracking structures in hypersonic turbulent boundary layers
  - Adviser: Pino Martín
- **Research Assistant**, Instituto Tecnológico de Buenos Aires, Argentina (Summer 2008)
  - Federal Aviation Administration certification for an affordable light aircraft design

TEACHING EXPERIENCE

- **Teaching Assistant**, ME 19ab Fluid Mechanics, Caltech, Pasadena, CA (Fall 2011/Winter 2012)
- **Guest Lecturer**, ME 19ab Fluid Mechanics, Caltech, Pasadena, CA (Spring 2014, Winter 2012, Fall 2011)
- **Guest Lecturer**, CDS 140b Introduction to Dynamical Systems, Caltech, Pasadena, CA (Spring 2012)

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- **Guest Lecturer**, Ae/BE 242 Biological Flows: Propulsion, Caltech, Pasadena, CA (Winter 2011)
- **High School Biology Teacher**, Saint Andrew's Scots School, Buenos Aires, Argentina (Summer 2006)

PEER-REVIEWED PUBLICATIONS

5. **O'Farrell, C.** and Dabiri, J.O., "Nested contour-dynamic models for axisymmetric vortex rings and vortex wakes," *Journal of Fluid Mechanics* **748**: 521-548 (2014) [PDF]

4. **O'Farrell, C.** and Dabiri, J.O., "Pinch-off of non-axisymmetric vortex rings," *Journal of Fluid Mechanics* **740**: 61-96 (2014) [PDF]

3. **O'Farrell, C.** and Dabiri, J.O., "Perturbation response and pinch-off of vortex rings and dipoles," *Journal of Fluid Mechanics* **740**:280-300 (2012) [PDF]

2. **O'Farrell, C.** and Dabiri, J.O., "A Lagrangian approach to identifying vortex pinch-off," *Chaos* **20**:017513 (2010) [PDF]

1. **O'Farrell, C.** and Martín M.P., "Chasing eddies and their wall signature in DNS data of Turbulent Boundary Layers," *Journal of Turbulence* **10**:15 (2009) [HTML]

CONFERENCE PROCEEDINGS, ABSTRACTS

13. **O'Farrell C.** and Dabiri J.O., "Nested contour-dynamic models for axisymmetric vortex rings and vortex wakes" 66th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Pittsburgh PA (November 2013) [HTML]

12. **O'Farrell C.** and Dabiri J.O., "Pinch-off and optimal vortex formation in biological propulsion" SIAM Conference on Applications of Dynamical Systems, Snowbird UT (May 2013) [HTML]

11. **O'Farrell C.** and Dabiri J.O., "Perturbation response of model vortex rings and dipoles" 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego CA (November 2012) [HTML]

10. **O'Farrell C.** and Dabiri J.O., "The formation of non-axisymmetric vortex rings" 23rd International Congress on Theoretical and Applied Mechanics, Beijing, China (August 2012) [PDF]

9. **O'Farrell C.**, Whittlesey R.W. and Dabiri J.O., "The formation of vortex rings from elliptical nozzles" 64th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore MD (November 2011) [HTML]

8. **O'Farrell C.** and Dabiri J.O., "Optimal vortex formation in biological propulsion." Workshop on Resonance, Flexibility and Biopropulsion, Princeton University, Princeton NJ (July 2011)

7. **O'Farrell C.** and Dabiri J.O., "Vortex 'pinch-off' in the Norbury and Pierrehumbert families of vortices." Workshop on Coherent Structures in Dynamical Systems, Lorentz Center, Universiteit Leiden, The Netherlands (May 2011) [HTML]

6. **O'Farrell C.** and Dabiri J.O., "Vortex 'pinch-off' in the Norbury family of vortices." Southern California Symposium on Flow Physics, University of Southern California, Los Angeles CA (April 2011)

5. **O'Farrell C.** and Dabiri J.O., "The stability of a family of vortex rings." 63rd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Long Beach CA (November 2010) [HTML]

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4. **O'Farrell C.** and Dabiri J.O., "Lagrangian Coherent Structures in the wake of an anguilliform swimmer." Workshop on Natural Locomotion in Fluids and on Surfaces, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis MN (June 2010) [HTML]

3. **O'Farrell C.** and Dabiri J.O., "A Lagrangian analysis of the wake of an anguilliform swimmer." Southern California Symposium on Flow Physics, University of California, Irvine CA (April 2010)

2. **O'Farrell C.** and Dabiri J.O., "A Lagrangian approach to identifying vortex pinch-off." 62nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Minneapolis MN (November 2009) [HTML]

1. **O'Farrell C.**, Priebe S., and Martín M.P. , "The wall signature of hairpin packets in turbulent boundary layers" 60th Annual Meeting of the American Physical Society Division of Fluid Dynamics, Salt Lake City UT (November 2007) [HTML]

FELLOWSHIPS AND AWARDS

- **Graduate Fellowships**
  - National Science Foundation Graduate Research Fellowship (2008-2012)
  - Betty and Gordon Moore Fellowship (California Institute of Technology, 2008-2009)
- **Research Achievement**
  - U.S. National Committee for Theoretical and Applied Mechanics Travel Grant (2012)
  - NSF Travel Grant for the Lorentz Center Workshop on Coherent Structures in Fluid Flows (2011)
  - Honorable Mention, Donald Janssen Dike Award for Undergraduate Research (Princeton University, June 2008)
  - Sigma Xi National Research Honor Society Book Award (Princeton University, June 2008)
- **Academic Achievement**
  - Sau-Hai Lam *58 Prize in Mechanical and Aerospace Engineering (Princeton University, 2008)
  - Harold T. Shapiro Prize for Academic Excellence (Princeton University, October 2006)

ADDITIONAL TRAINING

- **H. G. Heinrich Parachute Technology Short Course** National Institute of Aerospace, Portsmouth, VA (June 2-6, 2014)
- **Scientific SCUBA Diving**, American Academy of Underwater Sciences, University of California - Los Angeles (September 2009 -June 2010)
- **Competent Communicator**, Caltech Chapter, Toastmasters International (June 2012)

OTHER ACTIVITIES

- **Organizing Committee**, Conference for Undergraduate Women in Physics - West, Pasadena, CA (January 18-20, 2013)
- **Secretary**, Caltech Chapter, Toastmasters International (2012)
- **Vice-President and Social Chair**, International Students Association at Princeton (2005-2007)