DANIEL B. QUINN

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Research interests: fluid-structure interactions, biomechanics, autonomous vehicles, energy harvesting, aeroacoustics, interfacial flows, cyber-physical systems, motor-learning, propulsor wakes.

APPOINTMENTS

Assistant Professor 2016 - Present

University of Virginia, Charlottesvile, VA

Departments of Mechanical and Aerospace Engineering, Electrical and Computer Engineering

Leading an experimental fluid dynamics lab that studies smart fluidic systems such as autonomous vehicles and adaptive energy harvesters. The lab is part of the Link Lab, a multi-departmental initiative to study the applications of Cyber-Physical Systems.

Postdoctoral Researcher 2015 - 2016

Stanford University, Stanford, CA

Department of Mechanical Engineering

Working with Professor David Lentink in the Fluids & Robotics Lab, using a closed-loop turbulence generation system to study the maneuvers of birds and UAVs in the presence of gusts.

Research Assistant 2012 - 2015

Princeton University, Princeton, NJ

Department of Mechanical and Aerospace Engineering

Worked with Professor Lex Smits to study flexible propulsor design, including the creation of scaling laws and closed-loop search algorithms to optimize swimming efficiency.

Visiting Fellow 2012 - 2014

Harvard University, Cambridge, MA

Department of Organismal and Evolutionary Biology

Worked with Professor George Lauder in the Lauder Lab, studying the roles of flexibility and ground effect in the swimming efficiency of rays and skates.

EDUCATION

Princeton University

Ph.D. in Mechanical and Aerospace Engineering; PI: Prof. Alexander Smits *2015*

Teaching Transcript *2014*

M.A. in Mechanical and Aerospace Engineering *2012*

University of Virginia, Charlottesville

B.S. in Aerospace Engineering *2010*

Thomas Jefferson High School for Science and Technology *2006*

AWARDS

- Khan Academy Talent Search Winner; 2015
- Emerging Alumni Scholar (Princeton); 2014
- 1st Place at Princeton MAE Research Day; 2013
- NSF GFRP Honorable Mention; 2011
- Francis Upton Fellow (Princeton); 2010
- SEAS Outstanding Student Award (UVA); 2010
- Rodman Scholar (UVA); 2009

PROFESSIONAL SOCIETIES

- Society for Integrative and Comparative Biology; 2015
- American Physical Society; 2012
- Raven Society (UVA High Honor Society); 2010
- Tau Beta Pi (Engineering Honor Society); 2008
- Sigma Gamma Tau (Aerospace Honor Society); 2008

OUTREACH

Educational Video Producer 2006-present
YouTube *Web-based*

Writing, directing, and editing short videos that explain fluid dynamics to a general audience; videos have received over 300,000 views and have been featured on National Public Radio, TedEd, and Khan Academy.

Co-Founder 2013, 2014, 2015
Harlem Prep to Princeton *Princeton, NJ*

Organized a now annual field trip for Harlem Prep 4th graders in which students participate in lab demos in the Princeton MAE department.

Selection Committee Member 2015
Breakthrough Junior Challenge *Web-based*

Scored and commented on dozens of educational videos written and produced by students, ages 13-18, as part of an international contest promoting science and math education.

Co-Founder 2013
Art of Science Video *Princeton, NJ*

Organized a contest where Princeton students and local high-schoolers submitted artistic videos stumbled upon during the course of scientific research.

Media Consultant 2013
Pearson Education *Web-based*

Reviewed interactive modules that became part of an undergraduate online physics textbook.

PUBLICATIONS

- Quinn, D.B., Van Halder, Y., & Lentink, D. 2016. Adaptive control of turbulence intensity is accelerated by frugal flow sampling. *Interface* (in preparation)
- Gutierrez, E., Quinn, D.B., Chin, D.D., & Lentink, D. 2016. Lift calculations based on accepted wake models for animal flight are inconsistent and sensitive to vortex dynamics. *Bioinspiration and Biomimetics* (under review)
- Quinn, D.B., & Rosenberg, B.J. 2015. Inverted glass harp. *Physical Review E.* **92** (2), 021003.
- Quinn, D.B., Lauder, G.V., & Smits, A.J. 2015. Maximizing the efficiency of a flexible propulsor using experimental optimization. *Journal of Fluid Mechanics.* **767**, 430-448.
- Quinn, D.B. 2015. Optimizing the efficiency of batoid-inspired swimming (Doctoral dissertation). Department of Mechanical & Aerospace Engineering, Princeton University. T-3295.
- Quinn, D.B., Lauder, G.V., & Smits, A.J. 2014. Scaling the propulsive performance of heaving flexible panels. *Journal of Fluid Mechanics.* **738**, 250-267.
- Quinn, D.B., Moored, K.W., Dewey, P.A., & Smits, A.J. 2014. Unsteady propulsion near a solid boundary. *Journal of Fluid Mechanics.* **742**, 152-170.
- Quinn, D.B., Lauder, G.V., & Smits, A.J. 2014. Flexible propulsors in ground effect. *Bioinspiration and Biomimetics.* **9** (036008).
- Dewey, P.A., Quinn, D.B., Boschitsch, B.M., & Smits, A.J. 2014. Propulsive performance of unsteady tandem hydrofoils in a side-by-side configuration. *Physics of Fluids.* **26** (041903).
- Quinn, D.B., Feng, J., & Stone, H.A. 2013. Analytical model for the deformation of a fluid-fluid interface beneath an AFM probe. *Langmuir.* **29** (5), 1427-1434.

ADDITIONAL EXPERIENCE

Teaching

- *Guest Lecturer* (3 lectures) for Intro to Fluid Mechanics (ME70, Undergraduate Level) Stanford University; 2015
- *Guest Lecturer* (2 lectures) for Biomechanics of Flight (ME303, Graduate Level) Stanford University; 2015, 2016
- *Assistant Instructor* for Ordinary Differential Equations (MAE305, Undergraduate Level) Princeton University; 2014
- *Assistant Instructor* for Viscous Flows and Boundary Layers (MAE552, Graduate Level) Princeton University; 2013
- *Assistant Instructor* for Intro to Fluid Mechanics (MAE335, Undergraduate Level) Princeton University; 2012

Peer review

- *Referee* for Journal of Fluid Mechanics; 2014, 2015, 2016

- *Referee* for The American Institute of Aeronautics and Astronautics (AIAA) Journal; 2016
- *Referee* for Bio-inspiration for Marine Technologies; 2016
- *Referee* for The Journal of Fluids Engineering; 2016
- *Referee* for Aerospace; 2016
- *Referee* for Bioinspiration and Biomimetics; 2014, 2016
- *Referee* for Journal of Fluids and Structures; 2015
- *Referee* for Ships and Offshore Structures; 2014

Mentoring

- *Mentor* for Sofia Minano, Visiting Student Researcher, Stanford University; 2016-present
- *Mentor* for Eric Gutierrez, Graduate Student, Stanford University; 2015-present
- *Mentor* for Yous van Halder, Visiting Researcher, Eindhoven University of Technology; 2015
- *Mentor* for Oliver Badaoui, Visiting Researcher, University of Glasgow; 2013-2014
- *Mentor* for Stefano Chiazza, Visiting Researcher, Institut Suprieur de l'Aronautique et de l'Espace; 2013
- *Mentor* for Florian Bremer, Visiting Researcher, Technische Universität; 2013
- *Mentor* for Caden Ohlwiler, Undergraduate Student, Princeton University; 2012
- *Mentor* for Katherine Bedkowski, Undergraduate Student, Princeton University; 2012

Other

- *Coding experience*: proficient in MATLAB, Mathematica, Latex, Java, Python
- *Author* and *Co-Director* of "Unraveling Avian Gusts Mitigation Strategies to Make MAVs more Robust", a protocol for the handling and treatment of parrotlets, lovebirds, and hummingbirds for the Administrative Panel on Laboratory Animal Care (APLAC); 2015.

SELECTED PRESENTATIONS

National/International Conferences

- Quinn, D.B., Kress, D., & Lentink, D. How body size affects head stabilization in flying birds. Soc. for Exp. Bio., Brighton, UK. July 2016.
- Quinn, D.B. & Lentink, D. Inferring forces from kinematics in animal locomotion (Poster). Soc. for Int. & Comp. Bio., Portland, OR. January 2016. Abstract: 1356-641107.
- Quinn, D.B., Lauder, G.V. & Smits, A.J. Maximizing the efficiency of a flexible propulsor using experimental optimization. Am. Phys. Soc. Div. of Fluid Dyn., San Francisco, CA. November 2014. Abstract: R6.00009.

- Quinn, D.B., Lauder, G.V. & Smits, A.J. Scaling the hydrodynamic performance of heaving flexible panels. Am. Phys. Soc. Div. of Fluid Dyn., Pittsburgh, PA. November 2013. Abstract: G17.00004.
- Quinn, D.B., Moored, K.M., Dewey, P.A., Lauder, G.V. & Smits, A.J. Swimming near the wall. Am. Phys. Soc. Div. of Fluid Dyn., San Diego, CA. November 2012. Abstract: G15.00004.
- Quinn, D.B., Dewey, P.A., Moored, K.M., & Smits, A.J. Benefits of unsteady swimming near a wall. Am. Phys. Soc. Div. of Fluid Dyn., Baltimore, MD. November 2011. Abstract: H28.00002.
- Quinn, D.B., Rein-Weston, D., Dewey, P.A., Green, M., & Smits, A.J. Propulsive performance of oscillating batoid-inspired fins. Am. Phys. Soc. Div. of Fluid Dyn., Minneapolis, MN. November 2009. Abstract: BV.00007.

Competitive Talks

- Quinn, D.B. & Smits, A.J. Swimming near the bottom of the pool. Princeton MAE Research Day. Princeton, NJ. September 2013. 1st Prize.

Multi-University Meetings

- Quinn, D.B., Dewey, P.A., Moored, K.W., Lauder, G.V., & Smits, A.J. Thrust and efficiency for flexible propulsors: ground effect and fin interactions. ONR MURI. Program Manager: Bob Brizzolara. Arlington, VA. October 2013.
- Quinn, D.B., Lauder, G.V., Moored, K.W., Dewey, P.A., & Smits, A.J. Scaling the performance of flexible heaving panels. 1000 Islands Fluid Dyn. Meeting. Gananoque, Ontario. April 2013.
- Quinn, D.B., Lauder, G.V., Moored, K.W., Dewey, P.A., & Smits, A.J. Scaling the performance of flexible heaving panels. ONR MURI. Program Manager: Bob Brizzolara. Arlington, VA. April 2013.
- Quinn, D.B., Smits, A.J., & Lauder, G.V. Effects of flexibility in swimming. Winter Workshop on Locomotion. New Orleans, LA. January 2013.
- Quinn, D.B., Dewey, P.A., Moored, K.W., & Smits, A.J. Unsteady propulsors near walls and with passive flexibility. ONR MURI. Program Manager: Bob Brizzolara. Blacksburg, VA. April 2012.
- Quinn, D.B., Moored, K.W.. Dewey, P.A. & Smits, A.J. Unsteady propulsors in ground effect. 1000 Islands Fluid Dyn. Meeting. Gananoque, Ontario. April 2012.
- Quinn, D.B., Dewey, P.A., Moored, K.W., & Smits, A.J. Swimming near boundaries. ONR MURI. Program Manager: Bob Brizzolara. Carderock, MD. October 2011.
- Quinn, D.B. & Smits, A.J. Near-wall effects on oscillating fins. 1000 Islands Fluid Dyn. Meeting. Gananoque, Ontario. April 2011.

MEDIA COVERAGE

- "Flying in Place"; May 4, 2016; Slate Magazine
  http://www.slate.com/articles/video/video/2016/05/...

- "Stanford scientists are using a bird treadmill to improve drones"; Apr 26, 2016; Observer http://observer.com/2016/04/stanford-scientists-are-using-a-bird-treadmill-to-improve-drones/
- "The Marangoni Effect – an affair with surface tension"; Oct 23, 2015; ZME Science http://www.zmescience.com/science/physics/marangoni-effect-affair-surface-tension/
- "The Inverted Glass Harp"; Oct 15, 2015; The Kid Should See This http://thekidshouldseethis.com/post/the-inverted-glass-harp
- "The Inverted Glass Harp"; Sep 16, 2015; Fuck Yeah Fluid Dynamics http://fuckyeahfluiddynamics.tumblr.com/post/129216945630/...
- "Make Your Own 'Inverted' Glass Harp with Just One Glass"; Sep 1, 2015; Gizmodo http://gizmodo.com/make-your-own-inverted-glass-harp...
- "Physicist discovers wine glass in water is an even better instrument than water in wine glass"; Aug 27, 2015; The Independent http://www.independent.co.uk/arts-entertainment/music/news/...
- "Submerge a wine glass in water to make 'inverted harp of glass'"; Aug 26, 2015; New Scientist Magazine https://www.newscientist.com/article/dn28089-submerge-a-wine-glass...
- "Why Is My Wine Crying?"; Apr 29, 2015; Drink Wine with Dinner http://rosinawilson.com/wine-tears-apr-2015/
- "Podcast: Wine Physics"; Apr 22, 2015; Physics Buzz http://physicsbuzz.physicscentral.com/2015/04/podcast-wine-physics.html
- "Life with Wine: "Why Does Wine Cry?"; Sep. 8, 2014; Bottlenotes http://www.bottlenotes.com/the-daily-sip/wine-tips/science-of-wine-legs-september-2014
- "The wonder of fungus, dirt and parasites: Exhibition showcases stunning scientific photographs and animations"; Jul 30, 2014; Daily Mail http://www.dailymail.co.uk/sciencetech/article-2709388/...
- "Princeton launches Art of Science 2014 online galleries"; Jul 29, 2014; Princeton Art of Science http://artofsci.princeton.edu/princeton-launches-art-of-science-2014-online-galleries/
- "Crying In Your Glass"; May 12, 2014; Winemaker Magazine https://winemakermag.com/blogs/crying-in-your-glass
- "Watch: Why Does Wine Cry?"; Nov 15, 2013; Vinepair http://vinepair.com/wine-blog/wine-cry/
- "Wine Crying Shouldnt Make You Cry"; Nov 15, 2013; Nontrivial Problems https://nontrivialproblems.wordpress.com/2013/11/15/wine-crying...
- "My Wine Won't Stop Crying – A Mystery In A Wineglass"; Nov. 14, 2013; Radio Lab on National Public Radio http://www.npr.org/sections/krulwich/2013/11/12/244796108/my-wine...
- "Wine Snobs: Justified by Science, Sort Of"; Nov. 14, 2013; The Atlantic http://www.theatlantic.com/technology/archive/2013/11/wine-snobs...

- "Why does wine cry?"; Nov. 7, 2013; Princeton Engineering Facebook Page https://www.facebook.com/princetonengineering/posts/10152066713269954
- "Art Competition Shows Off the Unexpected Beauty of Science"; Jun 8, 2013; Wired http://www.wired.com/2013/06/art-of-science/
- "Princeton University Celebrates the Art of Science"; May 21, 2013; The Smithsonian http://www.smithsonianmag.com/science-nature/princeton...
- "Time-Lapse Legs of Wine"; Apr 24, 2013; Fuck Yeah Fluid Dynamics http://fuckyeahfluiddynamics.tumblr.com/post/48776241662/...