Bio

John Dabiri is Professor of Civil & Environmental Engineering and of Mechanical Engineering at Stanford University. His research focuses on science and technology at the intersection of fluid mechanics, energy and environment, and biology. Honors for this work include a MacArthur Fellowship, an Office of Naval Research Young Investigator Award, and a Presidential Early Career Award for Scientists and Engineers (PECASE). Popular Science magazine named him one of its "Brilliant 10" scientists for his research in bio-inspired propulsion. For his research in bio-inspired wind energy, Bloomberg Businessweek magazine listed him among its Technology Innovators, and MIT Technology Review magazine named him one of its 35 innovators under 35. In 2014, he was elected a Fellow of the American Physical Society, and in 2018 he won the Eugene L. Grant Award for Excellence in Teaching. He currently serves on the Editorial Boards of the Journal of Fluid Mechanics and the Journal of the Royal Society Interface.

John received his B.S.E. summa cum laude in Mechanical & Aerospace Engineering from Princeton University in 2001, his M.S. in Aeronautics from Caltech in 2003, and his Ph.D. in Bioengineering with a minor in Aeronautics from Caltech in 2005. He joined the Caltech faculty in 2005, was granted tenure in 2009, and he was promoted to full professor in 2010. During his 10 years on the Caltech faculty, he served as Chair of the Faculty Board and as the Dean of Students.

ACADEMIC APPOINTMENTS

- Professor, Civil and Environmental Engineering
- Professor, Mechanical Engineering
- Senior Fellow, Precourt Institute for Energy
- Member, Bio-X

HONORS AND AWARDS

- Eugene L. Grant Award for Excellence in Teaching, Stanford University (2018)
- Fellow, American Physical Society (2014)
- Presidential Early Career Award for Scientists and Engineers (PECASE), Office of Science and Technology Policy (2009)
PROFESSIONAL EDUCATION

- Ph.D., California Institute of Technology, Bioengineering with minor in Aeronautics (2005)
- M.S., California Institute of Technology, Aeronautics (2003)
- B.S.E. summa cum laude, Princeton University, Mechanical and Aerospace Engineering (2001)

LINKS

- Dabiri Lab Website: http://dabirilab.com

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The Dabiri Lab conducts research at the intersection of fluid mechanics, energy and environment, and biology.

Teaching

COURSES

2018-19
- Mechanical Measurements: ME 149 (Spr)

2017-18
- Physics of Wind Energy: CEE 261B, ENERGY 262, ME 262 (Win)

2016-17
- Fluid Mechanics: ME 351A (Aut)

2015-16
- Mechanics of Fluids: CEE 101B (Spr)
- Physics of Wind Energy: CEE 261, ME 262 (Win)
- Seminar in Fluid Mechanics: ENGR 298 (Win)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)
Valerie Troutman

Master's Program Advisor
Sara Berg-Love, Binita Thapa, Bruis van Vlijmen

Doctoral Dissertation Co-Advisor (AC)
Lily Buechler, Michael Howland, Siobhan Powell

Publications

PUBLICATIONS


- Wind farm power optimization through wake steering. Proceedings of the National Academy of Sciences of the United States of America
Howland, M. F., Lele, S. K., Dabiri, J. O.  
2019

• 'Work on problems you most enjoy’  *NATURE*  
Dabiri, J. O.  
2019; 567 (7747): 175

• Simultaneous coherent structure coloring facilitates interpretable clustering of scientific data by amplifying dissimilarity  *PLOS ONE*  
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• Simultaneous coherent structure coloring facilitates interpretable clustering of scientific data by amplifying dissimilarity.  *PloS one*  
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Sivaram, V., Dabiri, J. O., Hart, D. M.  
2018; 2 (9): 1639–42

• Single-camera three-dimensional tracking of natural particulate and zooplankton  *MEASUREMENT SCIENCE AND TECHNOLOGY*  
Troutman, V. A., Dabiri, J. O.  
2018; 29 (7)

• Vertically migrating swimmers generate aggregation-scale eddies in a stratified column  *NATURE*  
Houghton, I. A., Koseff, J. R., Monismith, S. G., Dabiri, J. O.  
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Miller, M. A., Duvvuri, S., Brownstein, I., Lee, M., Dabiri, J. O., Hultmark, M.  
2018; 844: 707–20

• Public receptiveness of vertical axis wind turbines  *ENERGY POLICY*  
Hui, I., Cain, B. E., Dabiri, J. O.  
2018; 112: 258–71

• A pressure-based force and torque prediction technique for the study of fish-like swimming  *PLOS ONE*  
Lucas, K. N., Dabiri, J. O., Lauder, G. V.  
2017; 12 (12): e0189225

• BIOMECHANICS How fish feel the flow  *NATURE*  
Dabiri, J. O.  
2017; 547 (7664): 406–7

• Transition to bluff-body dynamics in the wake of vertical-axis wind turbines  *JOURNAL OF FLUID MECHANICS*  
Araya, D. B., Colonius, T., Dabiri, J. O.  
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• Coherent structure colouring: identification of coherent structures from sparse data using graph theory  *JOURNAL OF FLUID MECHANICS*  
Schlueter-Kuck, K. L., Dabiri, J. O.  
2017; 811: 468-486

• Motile cilia create fluid-mechanical microhabitats for the active recruitment of the host microbiome.  *Proceedings of the National Academy of Sciences of the United States of America*
2017; 114 (36): 9510–16

- Identification of individual coherent sets associated with flow trajectories using coherent structure coloring. *Chaos (Woodbury, N.Y.)*
Schlueter-Kuck, K. L., Dabiri, J. O.
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- Self-similarity and flow characteristics of vertical-axis wind turbine wakes: an LES study *JOURNAL OF TURBULENCE*
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Craig, A. E., Dabiri, J. O., Koseff, J. R.
2017; 9 (1)

- How the bending kinematics of swimming lampreys build negative pressure fields for suction thrust *JOURNAL OF EXPERIMENTAL BIOLOGY*
2016; 219 (24): 3884-3895

- Flow Kinematics in Variable-Height Rotating Cylinder Arrays *JOURNAL OF FLUIDS ENGINEERING-TRANSACTIONS OF THE ASME*
Craig, A. E., Dabiri, J. O., Koseff, J. R.
2016; 138 (11)

- Performance enhancement of downstream vertical-axis wind turbines *JOURNAL OF RENEWABLE AND SUSTAINABLE ENERGY*
Brownstein, I. D., Kinzel, M., Dabiri, J. O.
2016; 8 (5)

- A Kinematic Description of the Key Flow Characteristics in an Array of Finite-Height Rotating Cylinders *JOURNAL OF FLUIDS ENGINEERING-TRANSACTIONS OF THE ASME*
Craig, A. E., Dabiri, J. O., Koseff, J. R.
2016; 138 (7)

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- Three-dimensional flow field around and downstream of a subscale model rotating vertical axis wind turbine *EXPERIMENTS IN FLUIDS*
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- Vertical axis wind turbine in a falling soap film *PHYSICS OF FLUIDS*
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- A comparison of wake measurements in motor-driven and flow-driven turbine experiments *EXPERIMENTS IN FLUIDS*
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  Wilhelmus, M. M., Dabiri, J. O.
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- **Emergent aerodynamics in wind farms**  *PHYSICS TODAY*
  Dabiri, J. O.
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- **Nested contour dynamics models for axisymmetric vortex rings and vortex wakes**  *JOURNAL OF FLUID MECHANICS*
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  O'Farrell, C., Dabiri, J. O.
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  O’Farrell, C., Dabiri, J. O.
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  Feitl, K. E., Millett, A. F., Colin, S. P., Dabiri, J. O., Costello, J. H.
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• A viscosity-enhanced mechanism for biogenic ocean mixing NATURE
  Katija, K., Dabiri, J. O.
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  Wilson, M. M., Peng, J., Dabiri, J. O., Eldredge, J. D.
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• Transport of inertial particles by Lagrangian coherent structures: application to predator-prey interaction in jellyfish feeding JOURNAL OF FLUID MECHANICS
  Peng, J., Dabiri, J. O.
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• Optimal Vortex Formation as a Unifying Principle in Biological Propulsion ANNUAL REVIEW OF FLUID MECHANICS
  Dabiri, J. O.
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  Peng, J., Dabiri, J. O.
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• In situ field measurements of aquatic animal-fluid interactions using a Self-Contained Underwater Velocimetry Apparatus (SCUVA) LIMNOLOGY AND OCEANOGRAPHY-METHODS
  Katija, K., Dabiri, J. O.
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  Peng, J., Dabiri, J. O.
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• Medusan morphospace: phylogenetic constraints, biomechanical solutions, and ecological consequences INVERTEBRATE BIOLOGY
  Costello, J. H., Colin, S. P., Dabiri, J. O.
  2008; 127 (3): 265-290

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  Shadden, S. C., Katija, K., Rosenfeld, M., Marsden, J. E., Dabiri, J. O.
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• A potential-flow, deformable-body model for fluid-structure interactions with compact vorticity: application to animal swimming measurements EXPERIMENTS IN FLUIDS
  Peng, J., Dabiri, J. O.
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- **Renewable fluid dynamic energy derived from aquatic animal locomotion**  *BIOINSPIRATION & BIOMIMETICS*
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- **Morphological diversity of medusan lineages constrained by animal-fluid interactions**  *JOURNAL OF EXPERIMENTAL BIOLOGY*
  Dabiri, J. O., Colin, S. P., Costello, J. H.
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- **Non-invasive measurement of instantaneous forces during aquatic locomotion: a case study of the bluegill sunfish pectoral fin**  *JOURNAL OF EXPERIMENTAL BIOLOGY*
  Peng, J., Dabiri, J. O., Madden, P. G., Lauder, G. V.
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- **The formation number of vortex rings formed in uniform background co-flow**  *JOURNAL OF FLUID MECHANICS*
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- **Fast-swimming hydromedusae exploit velar kinematics to form an optimal vortex wake**  *JOURNAL OF EXPERIMENTAL BIOLOGY*
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- **Effect of time-dependent piston velocity program on vortex ring formation in a piston/cylinder arrangement**  *PHYSICS OF FLUIDS*
  Shusser, M., Rosenfeld, M., Dabiri, J. O., Gharib, M.
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- **Note on the induced Lagrangian drift and added-mass of a vortex**  *JOURNAL OF FLUID MECHANICS*
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  Dabiri, J. O., Gharib, M., Colin, S. P., Costello, J. H.
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- **Flow patterns generated by oblate medusan jellyfish: field measurements and laboratory analyses**  *JOURNAL OF EXPERIMENTAL BIOLOGY*
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• A revised slug model boundary layer correction for starting jet vorticity flux  *THEORETICAL AND COMPUTATIONAL FLUID DYNAMICS*
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• Sensitivity analysis of kinematic approximations in dynamic medusan swimming models  *JOURNAL OF EXPERIMENTAL BIOLOGY*
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