

# Lei Fang Ph.D.

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## EDUCATION

2017 - 2020 **Stanford University, Stanford, California**

Ph.D., Civil and Environmental Engineering

Ph.D. minor, Computational and Mathematical Engineering

2015 - 2017 **Stanford University, Stanford, California**

M.S., Civil Engineering and Environmental Engineering

2012 - 2015 **Colorado State University, Fort Collins, Colorado**

B.S., *cum laude*, *First Place in the Department*, Environmental Engineering

## PEER-REVIEWED JOURNAL PUBLICATIONS (students are underlined)

- 2021 Si, Xinyu and **Fang, Lei**. "Toward the modeling of social distanced crowds: a new social distance term and the sidewall effect at bottlenecks," *Sci Rep* 11, 20982 (2021).
- 2021 **Fang, Lei** and Nicholas T. Ouellette. "Spectral condensation in laboratory two-dimensional turbulence," *Physical Review Fluids* 6, 104605 (2021).
- 2021 Si, Xinyu and **Fang, Lei**. "Preferential alignment and heterogeneous distribution of active non-spherical swimmers near Lagrangian coherent structures," *Physics of Fluids* 33, no. 7 (2021): 073303. **Chosen as Editor's Picks.**
- 2021 **Fang, Lei** and Nicholas T. Ouellette. "Assessing the information content of complex flows," *Physical Review E* 103, 023301 (2021).
- 2020 **Fang, Lei**, Sanjeeva Balasuriya, and Nicholas T. Ouellette. "Disentangling resolution, precision, and inherent stochasticity in nonlinear systems," *Physical Review Research* 2, 023343 (2020).
- 2020 Zhou, Zeyou, **Fang, Lei**, Nicholas T. Ouellette, and Haitao Xu. "Vorticity gradient stretching in the direct enstrophy transfer process of two-dimensional turbulence," *Physical Review Fluids* 5, 054602 (2020).
- 2019 **Fang, Lei**, S. Balasuriya, and Nicholas T. Ouellette. "Local linearity, coherent structures, and scale-to-scale coupling in turbulent flow," *Physical Review Fluids* 4, 014501 (2019).
- 2019 **Fang, Lei** and Nicholas T. Ouellette. "Transport across a bathymetric interface in quasi-two-dimensional flow," *Physical Review Fluids* 4, 064501 (2019).

- 2018 **Fang, Lei** and Nicholas T. Ouellette. “Influence of lateral boundaries on transport in quasi-two-dimensional flow,” *Chaos* 28, 023113 (2018). **Chosen as a Featured paper in Chaos**, and summarized in an **AIP Scilight**.
- 2017 **Fang, Lei** and Nicholas T. Ouellette. “Multiple stages of decay in two-dimensional turbulence,” *Physics of Fluids* 29, 111105 (2017).
- 2016 **Fang, Lei** and Nicholas T. Ouellette. “Advection and the efficiency of spectral energy transfer in two-dimensional turbulence,” *Phys. Rev. Lett.* 117, 104501 (2016).

## CONFERENCE AND ACADEMIC PRESENTATIONS

- 2019 **Fang, Lei** and Nicholas T. Ouellette. “Enhanced Spectral Transfer in Weakly Mixing Regions of a Turbulent Flow,” The 72nd Annual Meeting of the APS Division of Fluid Dynamics, November 23-26, Seattle, Washington, USA
- 2019 Nicholas T. Ouellette, **Fang, Lei** and Sanjeeva Balasuriya. “Disentangling Resolution, Precision, and Inherent Stochasticity in Fluid Mixing,” The 72nd Annual Meeting of the APS Division of Fluid Dynamics, November 23-26, Seattle, Washington, USA
- 2018 **Fang, Lei**, Nicholas T. Ouellette and Sanjeeva Balasuriya. “Local linearity, coherent structures, and scale-to-scale coupling in turbulent flow,” The 71st Annual Meeting of the APS Division of Fluid Dynamics, November 18-20, Atlanta, Georgia, USA
- 2017 **Fang, Lei** and Nicholas T. Ouellette. “Multiple stages of decay in two-dimensional turbulence,” The 70th Annual Meeting of the APS Division of Fluid Dynamics, November 19-21, Denver, Colorado, USA
- 2016 Nicholas T. Ouellette and **Fang, Lei**. “Advection and the efficiency of spectral energy transfer in two-dimensional turbulence,” The 69th Annual Meeting of the APS Division of Fluid Dynamics, November 20-22, Portland, Oregon, USA

## INVITED TALKS

- 2021 **Fang, Lei**. “Preferential alignment and heterogeneous distribution of active non-spherical swimmers near Lagrangian coherent structures,” Department of Civil and Environmental Engineering, Carnegie Mellon University, October 10, Pennsylvania, USA
- 2020 **Fang, Lei**. “Preferential alignment and heterogeneous distribution of active non-spherical swimmers near Lagrangian coherent structures,” Department of Mechanical Engineering, University of Massachusetts, Dartmouth, March 26, Massachusetts, USA
- 2020 **Fang, Lei**. “Preferential alignment and heterogeneous distribution of active non-spherical swimmers near Lagrangian coherent structures,” Depart-

ment of Mechanical Engineering, University of New Hampshire, December 11, Durham, New Hampshire, USA

2020 **Fang, Lei.** “Coherent Dynamics in Model Geophysical Flows,” Rowland Institute at Harvard, January 30, Cambridge, Massachusetts, USA

2020 **Fang, Lei.** “Coherent Dynamics in Model Geophysical Flows,” Department of Civil and Environmental Engineering, University of Pittsburgh, January 9, Pittsburgh, Pennsylvania, USA

2019 **Fang, Lei.** “Coherent Dynamics in Model Geophysical Flows,” Department of Mechanical Engineering, University of California, Berkeley, October 25, Berkeley, California, USA

## ACADEMIC POSITIONS

2020 - present **Assistant Professor (tenure track)**  
Civil and Environmental Engineering, University of Pittsburgh

2016 - 2020 **Graduate Research Assistant**  
Civil and Environmental Engineering, Stanford University  
Advisor: Prof. Nicholas T. Ouellette  
supported by the U.S. NSF under Grant No. CMMI-1563489

2014 Summer **Research Assistant**  
Colorado State University, Engineering Research Center

## RESEARCH EXPERIENCES AND INTERESTS

Coherent transport in geophysical flows

Two-dimensional turbulence dynamics

Active matter in complex flows

Fluid mechanics of disease transmission

Crowd dynamics

Developing physical tools for flow structure probing (Linear Neighborhood and Dynamical Linear Neighborhood)

## COURSES TAUGHT

Introduction to Water Resources Engineering  
Fluid Mechanics

## MENTORSHIPS

2021 Jamison Beveridge, Undergraduate student, University of Pittsburgh

Mentoring Content: Jamison Beveridge is a undergraduate student who received Mascaró Center for Sustainable Innovation (MCSI) summer research

grant. I mentor her to study the transport of non-spherical swimmers in the ocean flows.

- 2019            Zeyou Zhou, Ph.D. student, Tsinghua University  
Mentoring Content: Filter space technique  
Resulting Publication: Z. Zhou L. Fang, H. Xu, and N. T. Ouellette, “Vorticity gradient stretching is the possible physical mechanism of two-dimensional direct enstrophy transfer,” *Physical Review Fluids* 5, 054602 (2020).
- 2018            Yalin Mao, M.S. student, University of California, Los Angeles  
Mentoring Content: Machine learning algorithms
- 2017            Marios Galanis, M.S. student, Stanford University  
Mentoring Content: Probing flow structures using hyperbolic neighborhood (HN)

## PROFESSIONAL MEMBERSHIPS

- 2016 - 2019    **Member**, American Physical Society
- 2021 - present **Member**, American Geophysical Union
- 2017 - 2018    **Seminar Coordinator**, The Bob and Norma Street Environmental Fluid Mechanics Laboratory, Stanford University

## PROFESSIONAL MEMBERSHIPS

- 2019 - present **Peer Reviewer:**  
*Journal of Fluid Mechanics*  
*Physics of Fluids*  
*International Journal of Multiphase Flow*  
*Experimental Thermal and Fluid Science*  
*Journal of Fluid Engineering*  
*Journal of Hydraulic Research*  
*Journal of Geophysical Research - Oceans*
- 2021            Primary convener for American Geophysical Union Fall Meeting Session OS013-I-I. Non-spherical Swimmers in the Ocean

## RESEARCH FUNDING

- 2021 - 2022    **University of Pittsburgh Momentum Fund (\$16,000)**
- 2021 - 2026    **Department of Defense** Testing & Evaluation for Soldier-device Teaming Compatibility, Vulnerability, and Durability in Emergent Situations (**\$1,175,000**, equally shared with Prof. Amin Rahimian)

## AWARDS AND HONORS

- 2015            **Environmental Engineering Achievement Award**, Colorado State University
- 2015            **Graduate with Distinction, 1<sup>st</sup> place in the department**, Colorado State University
- 2013 - 2015    **Dean's Lists (five times)**, Colorado State University
- 2012 - 2015    **Colorado State University International Excellence Scholarship (total amount: \$24,000)**, Colorado State University
- 2012 - 2014    **Coca-Cola Water Scholars Program, Coca-Cola full scholarship (total amount: \$50,000)**, Colorado State University

### COMPUTER SKILLS

- Advanced      C++ (with CUDA, OpenMP, MPI project experiences), MATLAB, Python, R
- Intermediate    JAVA, ArcGIS, HEC-RAS, ANSYS Fluent, AutoCAD, Julia

### SOCIAL SERVICES

- 2018 - 2019    **Co-President**, Stanford Christian Students Club, Stanford University
- 2017 - 2019    **Coordinator and Volunteer**, Stanford New International Student Airport Pick up Program, Stanford University and The Church in Mountain View
- 2012 - 2013    **Officer**, Association of Chinese Students and Scholars, Colorado State University