Stanford

Nicholas Ouellette

Professor of Civil and Environmental Engineering

Curriculum Vitae available Online

CONTACT INFORMATION

- **Administrator**

  Jack Chiueh - Administrative Associate

  Email jchiueh@stanford.edu

  Tel 650-736-2274

Bio

BIO

Nick Ouellette is broadly interested the behavior of complex systems far from equilibrium. In particular, a running theme in his research is dynamical self-organization. He seeks both to understand the physical principles that govern the spontaneous emergence of low-dimensional structure in high-dimensional systems and to harness this self-organization for engineering applications. His current research includes studies of turbulent flows in two and three dimensions, in both simple and complex fluids; the transport of inertial, anisotropic, and active particles in turbulence; the erosion of granular beds by fluid flows and subsequent sediment transport; quantitative measurements of collective behavior in insect swarms and bird flocks; and emergent, self-organized structure and dynamics in cities.

Before coming to Stanford in 2015, Ouellette spent seven years on the faculty in Mechanical Engineering and Materials Science at Yale University. He has won awards for his teaching at both Yale and Stanford. Before beginning his faculty career, he held postdoctoral positions at the Max Planck Institute for Dynamics and Self-Organization and in the Physics Department at Haverford College.

ACADEMIC APPOINTMENTS

- Professor, Civil and Environmental Engineering
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Tau Beta Pi Teaching Honor Roll, Stanford University School of Engineering (2020)
- Outstanding Referee Award, American Physical Society (2019)
- Young Scientist Prize, Euromech (2015)
- Provost's Teaching Prize, Yale University (2014)

PROFESSIONAL EDUCATION

- Ph.D., Cornell University , Physics (2006)
- M.S., Cornell University , Physics (2005)

- B.A., Swarthmore College , Physics and Computer Science (2002)

LINKS

- Environmental Complexity Lab: http://web.stanford.edu/~nto

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The Environmental Complexity Lab studies self-organization in a variety of complex systems, ranging from turbulent fluid flows to granular materials to collective motion in animal groups. In all cases, we aim to characterize the macroscopic behavior, understand its origin in the microscopic dynamics, and ultimately harness it for engineering applications. Most of our projects are experimental, though we also use numerical simulation and mathematical modeling when appropriate. We specialize in high-speed, detailed imaging and statistical analysis.

Our current research includes studies of turbulence in two and three dimensions, with a focus on coherent structures and the geometry of turbulence; the transport of inertial, anisotropic, and active particles in turbulence; the erosion of granular beds by fluid flows and subsequent sediment transport; quantitative measurements of collective behavior in insect swarms and bird flocks; the stability of ocean ecosystems; neural signal processing; and uncovering the natural, self-organized spatiotemporal scales in urban systems.

Teaching

COURSES

2020-21

- Hydrodynamics: CEE 262A (Aut)
- Introduction to CEE Graduate Studies: CEE 379C (Aut)
- Introduction to PHD Studies in Civil and Environmental Engineering: CEE 379 (Aut)
- Topics in Fundamental Turbulence: CEE 363D (Win)

2019-20

- Hydrodynamics: CEE 262A (Win)
- Nonlinear Dynamics: CEE 201E (Aut)
- Physics of Cities: CEE 6, URBANST 109 (Spr)

2018-19

- Chaos and Turbulence: CEE 363B (Win)
- Hydrodynamics: CEE 262A (Aut)
- Measuring and Predicting Spatial Patterns: BIOS 276 (Win)
- Physics of Cities: CEE 6 (Spr)

2017-18

- Chaos and Turbulence: CEE 363B (Win)
- Discussion: Science and the Law: LAW 682D (Spr)
- Hydrodynamics: CEE 262A (Aut)
- Physics of Cities: CEE 6 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Hayoon Chung, Laura Clark, Davis Hoffman, Yukinobu Tanimoto, Paul Yi

Postdoctoral Faculty Sponsor

Patricia Yang

Doctoral Dissertation Advisor (AC)

Yenchia Feng, Saksham Gakhar, Marios Galanis, Jennifer Yin

Master's Program Advisor

Anvesh Badamikar, Zhihao Cheng, Xiatong Li, Joseph Speight, Yunfan Tao, Simba Wu, Ziyue Xiao

Publications

PUBLICATIONS

- **Shear response of granular packings compressed above jamming onset** *PHYSICAL REVIEW E*
  Wang, P., Zhang, S., Tuckman, P., Ouellette, N. T., Shattuck, M. D., O'Hern, C. S.
  2021; 103 (2): 022902
- **An equation of state for insect swarms.** *Scientific reports*
  Sinhuber, M., van der Vaart, K., Feng, Y., Reynolds, A. M., Ouellette, N. T.
  2021; 11 (1): 3773
- **Assessing the information content of complex flows** *PHYSICAL REVIEW E*
  Fang, L., Ouellette, N. T.
  2021; 103 (2)
- **Automated identification of urban substructure for comparative analysis.** *PloS one*
  Aras, R. L., Ouellette, N. T., Jain, R. K.
  2021; 16 (1): e0245067
- **Assessing the information content of complex flows.** *Physical review. E*
  Fang, L. n., Ouellette, N. T.
  2021; 103 (2-1): 023301
- **Detection of evolving Lagrangian coherent structures: A multiple object tracking approach** *PHYSICAL REVIEW FLUIDS*
  MacMillan, T., Ouellette, N. T., Richter, D. H.
  2020; 5 (12)
- **Settling of inertial nonspherical particles in wavy flow** *PHYSICAL REVIEW FLUIDS*
  Clark, L. K., DiBenedetto, M. H., Ouellette, N. T., Koseff, J. R.
  2020; 5 (12)
- **Temporal dynamics of the alignment of the turbulent stress and strain rate** *PHYSICAL REVIEW FLUIDS*
  Ballouz, J. G., Johnson, P. L., Ouellette, N. T.
  2020; 5 (11)
- **On the surface expression of bottom features in free-surface flow** *JOURNAL OF FLUID MECHANICS*
  Gakhar, S., Koseff, J. R., Ouellette, N. T.
  2020; 900
- **Disentangling resolution, precision, and inherent stochasticity in nonlinear systems** *PHYSICAL REVIEW RESEARCH*
  Fang, L., Balasuriya, S., Ouellette, N. T.
  2020; 2 (2)

- **Vorticity gradient stretching in the direct enstrophy transfer process of two-dimensional turbulence** *PHYSICAL REVIEW FLUIDS*
  Zhou, Z., Fang, L., Ouellette, N. T., Xu, H.
  2020; 5 (5)

- **Interaction between an inclined gravity current and a pycnocline in a two-layer stratification** *JOURNAL OF FLUID MECHANICS*
  Tanimoto, Y., Ouellette, N. T., Koseff, J. R.
  2020; 887

- **Geometric constraints on energy transfer in the turbulent cascade** *PHYSICAL REVIEW FLUIDS*
  Ballouz, J. G., Ouellette, N. T.
  2020; 5 (3)

- **Similarities between insect swarms and isothermal globular clusters** *PHYSICAL REVIEW RESEARCH*
  Gorbonos, D., van der Vaart, K., Sinhuber, M., Puckett, J. G., Reynolds, A. M., Ouellette, N. T., Gov, N. S.
  2020; 2 (1)

- **Environmental perturbations induce correlations in midge swarms.** *Journal of the Royal Society, Interface*
  van der Vaart, K., Sinhuber, M., Reynolds, A. M., Ouellette, N. T.
  2020; 17 (164): 20200018

- **Pair formation in insect swarms driven by adaptive long-range interactions.** *Journal of the Royal Society, Interface*
  Gorbonos, D. n., Puckett, J. G., van der Vaart, K. n., Sinhuber, M. n., Ouellette, N. T., Gov, N. S.
  2020; 17 (171): 20200367

- **Synergistic interactions among growing stressors increase risk to an Arctic ecosystem.** *Nature communications*
  Arrigo, K. R., van Dijken, G. L., Cameron, M. A., van der Grient, J., Wedding, L. M., Hazen, L., Leape, J., Leonard, G., Merkl, A., Micheli, F., Mills, M. M., Monismith, S., Ouellette, et al
  2020; 11 (1): 6255

- **Comparison of shear and compression jammed packings of frictional disks** *GRANULAR MATTER*
  Xiong, F., Wang, P., Clark, A. H., Bertrand, T., Ouellette, N. T., Shattuck, M. D., O'Hern, C. S.
  2019; 21 (4)

- **Collective turns in jackdaw flocks: kinematics and information transfer.** *Journal of the Royal Society, Interface*
  Ling, H., Mclvor, G. E., Westley, J., van der Vaart, K., Yin, J., Vaughan, R. T., Thornton, A., Ouellette, N. T.
  2019; 16 (159): 20190450

- **Interaction of a downslope gravity current with an internal wave** *JOURNAL OF FLUID MECHANICS*
  Ouillon, R., Meiburg, E., Ouellette, N. T., Koseff, J. R.
  2019; 873: 889–913

- **Modeling Environmental DNA Transport in the Coastal Ocean Using Lagrangian Particle Tracking** *FRONTIERS IN MARINE SCIENCE*
  Andruszkiewicz, E. A., Koseff, J. R., Fringer, O. B., Ouellette, N. T., Lowe, A. B., Edwards, C. A., Boehm, A. B.
  2019; 6

- **The Most Active Matter of All** *MATTER*
  Ouellette, N. T.
  2019; 1 (2): 297–99

- **Local interactions and their group-level consequences in flocking jackdaws.** *Proceedings. Biological sciences*
  Ling, H., Mclvor, G. E., van der Vaart, K., Vaughan, R. T., Thornton, A., Ouellette, N. T.
  2019; 286 (1906): 20190865

- **Transport across a bathymetric interface in quasi-two-dimensional flow** *PHYSICAL REVIEW FLUIDS*
  Fang, L., Ouellette, N. T.
  2019; 4 (6)

- **Costs and benefits of social relationships in the collective motion of bird flocks** *NATURE ECOLOGY & EVOLUTION*
  Ling, H., McIvor, G. E., van der Vaart, K., Vaughan, R. T., Thornton, A., Ouellette, N. T.
  2019; 3 (6): 943–48

- **Orientation dynamics of nonspherical particles under surface gravity waves** *PHYSICAL REVIEW FLUIDS*
  DiBenedetto, M. H., Koseff, J. R., Ouellette, N. T.
  2019; 4 (3)
- **Three-dimensional time-resolved trajectories from laboratory insect swarms** *SCIENTIFIC DATA*
  Sinhuber, M., van der Vaart, K., Ni, R., Puckett, J. G., Kelley, D. H., Ouellette, N. T.
  2019; 6
- **Local linearity, coherent structures, and scale-to-scale coupling in turbulent flow** *PHYSICAL REVIEW FLUIDS*
  Fang, L., Balasuriya, S., Ouellette, N. T.
  2019; 4 (1)
- **Flowing crowds** *SCIENCE*
  Ouellette, N. T.
  2019; 363 (6422): 27–28
- **Response of insect swarms to dynamic illumination perturbations.** *Journal of the Royal Society, Interface*
  Sinhuber, M. n., van der Vaart, K. n., Ouellette, N. T.
  2019; 16 (150): 20180739
- **Computational and Structural Advantages of Pairwise Flocking**
  Nagy, G., Thornton, A., Ling, H., McIvor, G., Ouellette, N. T., Vaugha, R., Sabattini, L.
  IEEE.2019: 133–35
- **Behavioural plasticity and the transition to order in jackdaw flocks.** *Nature communications*
  Ling, H. n., Mclvor, G. E., Westley, J. n., van der Vaart, K. n., Vaughan, R. T., Thornton, A. n., Ouellette, N. T.
  2019; 10 (1): 5174
- **Nonlinear dynamics captures brain states at different levels of consciousness in patients anesthetized with propofol.** *PloS one*
  Eagleman, S. L., Chander, D. n., Reynolds, C. n., Ouellette, N. T., MacIver, M. B.
  2019; 14 (10): e0223921
- **Mechanical spectroscopy of insect swarms.** *Science advances*
  van der Vaart, K. n., Sinhuber, M. n., Reynolds, A. M., Ouellette, N. T.
  2019; 5 (7): eaaw9305
- **Preferential orientation of spheroidal particles in wavy flow** *JOURNAL OF FLUID MECHANICS*
  DiBenedetto, M. H., Ouellette, N. T.
  2018; 856: 850–69
- **Simultaneous measurements of three-dimensional trajectories and wingbeat frequencies of birds in the field** *JOURNAL OF THE ROYAL SOCIETY INTERFACE*
  Ling, H., Mclvor, G. E., Nagy, G., MohaimenianPour, S., Vaughan, R. T., Thornton, A., Ouellette, N. T.
  2018; 15 (147)
- **Probing the strain-rotation balance in non-Newtonian turbulence with inertial particles** *PHYSICAL REVIEW FLUIDS*
  Sinhuber, M., Ballouz, J. G., Ouellette, N. T.
  2018; 3 (8)
- **Critical scaling near the yielding transition in granular media** *PHYSICAL REVIEW E*
  Clark, A. H., Thompson, J. D., Shattuck, M. D., Ouellette, N. T., O'Hern, C. S.
  2018; 97 (6)
- **Generalized Lagrangian coherent structures** *PHYSICA D-NONLINEAR PHENOMENA*
  Balasuriya, S., Ouellette, N. T., Rypina, I. I.
  2018; 372: 31–51
- **Remifentanil and Nitrous Oxide Anesthesia Produces a Unique Pattern of EEG Activity During Loss and Recovery of Response** *FRONTIERS IN HUMAN NEUROSCIENCE*
  Eagleman, S. L., Drover, C. M., Drover, D. R., Ouellette, N. T., MacIver, M.

2018; 12: 173

- **Shoaling internal waves may reduce gravity current transport** *ENVIRONMENTAL FLUID MECHANICS*
  Hogg, C. R., Egan, G. C., Ouellette, N. T., Koseff, J. R.
  2018; 18 (2): 383–94

- **Transport of anisotropic particles under waves** *JOURNAL OF FLUID MECHANICS*
  DiBenedetto, M. H., Ouellette, N. T., Koseff, J. R.
  2018; 837: 320–40

- **Influence of lateral boundaries on transport in quasi-two-dimensional flow** *CHAOS*
  Fang, L., Ouellette, N. T.
  2018; 28 (2): 023113

- **Tensor geometry in the turbulent cascade** *JOURNAL OF FLUID MECHANICS*
  Ballouz, J. G., Ouellette, N. T.
  2018; 835: 1048–64

- **Do Complexity Measures of Frontal EEG Distinguish Loss of Consciousness in Geriatric Patients Under Anesthesia?** *Frontiers in neuroscience*
  Eagleman, S. L., Vaughn, D. A., Drover, D. R., Drover, C. M., Cohen, M. S., Ouellette, N. T., MacIver, M. B.
  2018; 12: 645

- **Critical scaling near the yielding transition in granular media.** *Physical review. E*
  Clark, A. H., Thompson, J. D., Shattuck, M. D., Ouellette, N. T., O'Hern, C. S.
  2018; 97 (6-1): 062901

- **Determining the onset of hydrodynamic erosion in turbulent flow** *PHYSICAL REVIEW FLUIDS*
  Salevan, J. C., Clark, A. H., Shattuck, M. D., O'Hern, C. S., Ouellette, N. T.
  2017; 2 (11)

- **Characterizing free-surface expressions of flow instabilities by tracking submerged features** *EXPERIMENTS IN FLUIDS*
  Mandel, T. L., Rosenzweig, I., Chung, H., Ouellette, N. T., Koseff, J. R.
  2017; 58 (11)

- **Multiple stages of decay in two-dimensional turbulence** *PHYSICS OF FLUIDS*
  Fang, L., Ouellette, N. T.
  2017; 29 (11)

- **Phase Coexistence in Insect Swarms** *PHYSICAL REVIEW LETTERS*
  Sinhuber, M., Ouellette, N. T.
  2017; 119 (17): 178003

- **Are midge swarms bound together by an effective velocity-dependent gravity?** *EUROPEAN PHYSICAL JOURNAL E*
  Reynolds, A. M., Sinhuber, M., Ouellette, N. T.
  2017; 40 (4)

- **Role of grain dynamics in determining the onset of sediment transport** *PHYSICAL REVIEW FLUIDS*
  Clark, A. H., Shattuck, M. D., Ouellette, N. T., O'Hern, C. S.
  2017; 2 (3)

- **Hyperbolic neighbourhoods as organizers of finite-time exponential stretching** *JOURNAL OF FLUID MECHANICS*
  Balasuriya, S., Kalampattel, R., Ouellette, N. T.
  2016; 807: 509-545

- **Advection and the Efficiency of Spectral Energy Transfer in Two-Dimensional Turbulence.** *Physical review letters*
  Fang, L., Ouellette, N. T.
  2016; 117 (10): 104501-?

- **Long-range acoustic interactions in insect swarms: an adaptive gravity model** *NEW JOURNAL OF PHYSICS*
  Gorbonos, D., Ianconescu, R., Puckett, J. G., Ni, R., Ouellette, N. T., Gov, N. S.

2016; 18

- **Concentration effects on turbulence in dilute polymer solutions far from walls.** *Physical review. E*
de Chaumont Quitry, A., Ouellette, N. T.
2016; 93 (6): 063116-?

- **Stretching and folding in finite time.** *Chaos*
Ma, T., Ouellette, N. T., Bollt, E. M.
2016; 26 (2): 023112-?

- **Swarm dynamics may give rise to Lévy flights.** *Scientific reports*
Reynolds, A. M., Ouellette, N. T.
2016; 6: 30515-?

- **On the tensile strength of insect swarms.** *Physical biology*
Ni, R., Ouellette, N. T.
2016; 13 (4): 045002-?

- **Mixing and sink effects of air purifiers on indoor PM2.5 concentrations: A pilot study of eight residential homes in Fresno, California** *AEROSOL SCIENCE AND TECHNOLOGY*
Cheng, K., Park, H., Tetteh, A. O., Zheng, D., Ouellette, N. T., Nadeau, K. C., Hildemann, L. M.
2016; 50 (8): 835-845

- **Correlating Lagrangian structures with forcing in two-dimensional flow** *PHYSICS OF FLUIDS*
Ouellette, N. T., Hogg, C. A., Liao, Y.
2016; 28 (1)

- **Velocity correlations in laboratory insect swarms** *EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS*
Ni, R., Ouellette, N. T.
2015; 224 (17-18): 3271-3277

- **Optimal directional volatile transport in retronasal olfaction** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Ni, R., Michalski, M. H., Brown, E., Ngoc Doan, N., Zinter, J., Ouellette, N. T., Shepherd, G. M.
2015; 112 (47): 14700-14704

- **Onset and cessation of motion in hydrodynamically sheared granular beds** *PHYSICAL REVIEW E*
Clark, A. H., Shattuck, M. D., Ouellette, N. T., O'Hern, C. S.
2015; 92 (4)

- **Intrinsic Fluctuations and Driven Response of Insect Swarms** *PHYSICAL REVIEW LETTERS*
Ni, R., Puckett, J. G., Dufresne, E. R., Ouellette, N. T.
2015; 115 (11)

- **Time-Frequency Analysis Reveals Pairwise Interactions in Insect Swarms** *PHYSICAL REVIEW LETTERS*
Puckett, J. G., Ni, R., Ouellette, N. T.
2015; 114 (25)

- **Long-range ordering of turbulent stresses in two-dimensional flow** *PHYSICAL REVIEW E*
Liao, Y., Ouellette, N. T.
2015; 91 (6)

- **Measurements of the coupling between the tumbling of rods and the velocity gradient tensor in turbulence** *JOURNAL OF FLUID MECHANICS*
Ni, R., Kramel, S., Ouellette, N. T., Voth, G. A.
2015; 766

- **Empirical questions for collective-behaviour modelling** *PRAMANA-JOURNAL OF PHYSICS*
Ouellette, N. T.
2015; 84 (3): 353-363

- **Onset and cessation of motion in hydrodynamically sheared granular beds.** *Physical review. E, Statistical, nonlinear, and soft matter physics*

Clark, A. H., Shattuck, M. D., Ouellette, N. T., O'Hern, C. S.
2015; 92 (4): 042202

- **Long-range ordering of turbulent stresses in two-dimensional flow.** *Physical review. E, Statistical, nonlinear, and soft matter physics*
  Liao, Y. n., Ouellette, N. T.
  2015; 91 (6): 063004
- **Correlations between the instantaneous velocity gradient and the evolution of scale-to-scale fluxes in two-dimensional flow.** *Physical review. E, Statistical, nonlinear, and soft matter physics*
  Liao, Y. n., Ouellette, N. T.
  2015; 92 (3): 033017
- **Determining asymptotically large population sizes in insect swarms** *JOURNAL OF THE ROYAL SOCIETY INTERFACE*
  Puckett, J. G., Ouellette, N. T.
  2014; 11 (99)
- **Extracting turbulent spectral transfer from under-resolved velocity fields** *PHYSICS OF FLUIDS*
  Ni, R., Voth, G. A., Ouellette, N. T.
  2014; 26 (10)
- **Searching for effective forces in laboratory insect swarms** *SCIENTIFIC REPORTS*
  Puckett, J. G., Kelley, D. H., Ouellette, N. T.
  2014; 4
- **Impact fragmentation of model flocks** *PHYSICAL REVIEW E*
  Miller, P. W., Ouellette, N. T.
  2014; 89 (4)
- **Geometry of scale-to-scale energy and enstrophy transport in two-dimensional flow** *PHYSICS OF FLUIDS*
  Liao, Y., Ouellette, N. T.
  2014; 26 (4)
- **Direct observation of Kelvin waves excited by quantized vortex reconnection** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Fonda, E., Meichle, D. P., Ouellette, N. T., Hormoz, S., Lathrop, D. P.
  2014; 111: 4707-4710
- **Alignment of vorticity and rods with Lagrangian fluid stretching in turbulence** *JOURNAL OF FLUID MECHANICS*
  Ni, R., Ouellette, N. T., Voth, G. A.
  2014; 743
- **Stability of model flocks in turbulent-like flow** *NEW JOURNAL OF PHYSICS*
  Khurana, N., Ouellette, N. T.
  2013; 15
- **Lagrangian coherent structures separate dynamically distinct regions in fluid flows** *PHYSICAL REVIEW E*
  Kelley, D. H., Allshouse, M. R., Ouellette, N. T.
  2013; 88 (1)
- **Spatial structure of spectral transport in two-dimensional flow** *JOURNAL OF FLUID MECHANICS*
  Liao, Y., Ouellette, N. T.
  2013; 725: 281-298
- **Generation of Lagrangian intermittency in turbulence by a self-similar mechanism** *NEW JOURNAL OF PHYSICS*
  Wilczek, M., Xu, H., Ouellette, N. T., Friedrich, R., Bodenschatz, E.
  2013; 15
- **Quantifying stretching and rearrangement in epithelial sheet migration** *NEW JOURNAL OF PHYSICS*
  Lee, R. M., Kelley, D. H., Nordstrom, K. N., Ouellette, N. T., Losert, W.
  2013; 15

- **Emergent dynamics of laboratory insect swarms** *SCIENTIFIC REPORTS*
  Kelley, D. H., Ouellette, N. T.
  2013; 3
- **On the dynamical role of coherent structures in turbulence** *COMPTES RENDUS PHYSIQUE*
  Ouellette, N. T.
  2012; 13 (9-10): 866-877
- **Effects of forcing geometry on two-dimensional weak turbulence** *PHYSICAL REVIEW E*
  Liao, Y., Kelley, D. H., Ouellette, N. T.
  2012; 86 (3)
- **Interactions between active particles and dynamical structures in chaotic flow** *PHYSICS OF FLUIDS*
  Khurana, N., Ouellette, N. T.
  2012; 24 (9)
- **Turbulence in two dimensions** *PHYSICS TODAY*
  Ouellette, N. T.
  2012; 65 (5): 68–69
- **Spatiotemporal persistence of spectral fluxes in two-dimensional weak turbulence** *PHYSICS OF FLUIDS*
  Kelley, D. H., Ouellette, N. T.
  2011; 23 (11)
- **Path Lengths in Turbulence** *JOURNAL OF STATISTICAL PHYSICS*
  Ouellette, N. T., Bodenschatz, E., Xu, H.
  2011; 145 (1): 93-101
- **Neutrally buoyant particle dynamics in fluid flows: Comparison of experiments with Lagrangian stochastic models** *PHYSICS OF FLUIDS*
  Sapsis, T. P., Ouellette, N. T., Gollub, J. P., Haller, G.
  2011; 23 (9)
- **Mechanisms driving shape distortion in two-dimensional flow** *EPL*
  Quitry, A. d., Kelley, D. H., Ouellette, N. T.
  2011; 94 (6)
- **Separating stretching from folding in fluid mixing** *NATURE PHYSICS*
  Kelley, D. H., Ouellette, N. T.
  2011; 7 (6): 477-480
- **Reduced Transport of Swimming Particles in Chaotic Flow due to Hydrodynamic Trapping** *PHYSICAL REVIEW LETTERS*
  Khurana, N., Blawzdziewicz, J., Ouellette, N. T.
  2011; 106 (19)
- **Onset of three-dimensionality in electromagnetically driven thin-layer flows** *PHYSICS OF FLUIDS*
  Kelley, D. H., Ouellette, N. T.
  2011; 23 (4)
- **Rotation and alignment of rods in two-dimensional chaotic flow** *PHYSICS OF FLUIDS*
  Parsa, S., Guasto, J. S., Kishore, M., Ouellette, N. T., Gollub, J. P., Voth, G. A.
  2011; 23 (4)
- **Using particle tracking to measure flow instabilities in an undergraduate laboratory experiment** *AMERICAN JOURNAL OF PHYSICS*
  Kelley, D. H., Ouellette, N. T.
  2011; 79 (3): 267-273
- **Scale-local velocity fields from particle-tracking data** *CHAOS*
  Kelley, D. H., Ouellette, N. T.
  2010; 20 (4)

- **Scale-Dependent Statistical Geometry in Two-Dimensional Flow** *PHYSICAL REVIEW LETTERS*
  Merrifield, S. T., Kelley, D. H., Ouellette, N. T.
  2010; 104 (25)
- **Bulk turbulence in dilute polymer solutions** *JOURNAL OF FLUID MECHANICS*
  Ouellette, N. T., Xu, H., Bodenschatz, E.
  2009; 629: 375-385
- **Detecting topological features of chaotic fluid flow** *CHAOS*
  Ouellette, N. T., Gollub, J. P.
  2008; 18 (4)
- **Transport of Finite-Sized Particles in Chaotic Flow** *PHYSICAL REVIEW LETTERS*
  Ouellette, N. T., O'Malley, P. J., Gollub, J. P.
  2008; 101 (17)
- **Universal intermittent properties of particle trajectories in highly turbulent flows** *PHYSICAL REVIEW LETTERS*
  Arneodo, A., Benzi, R., Berg, J., Biferale, L., Bodenschatz, E., Busse, A., Calzavarini, E., Castaing, B., Cencini, M., Chevillard, L., Fisher, R. T., Grauer, R., Homann, et al
  2008; 100 (25)
- **Dynamic topology in spatiotemporal chaos** *PHYSICS OF FLUIDS*
  Ouellette, N. T., Gollub, J. P.
  2008; 20 (6)
- **Lagrangian structure functions in turbulence: A quantitative comparison between experiment and direct numerical simulation** *PHYSICS OF FLUIDS*
  Biferale, L., Bodenschatz, E., Cencini, M., Lanotte, A. S., Ouellette, N. T., Toschi, F., Xu, H.
  2008; 20 (6)
- **Evolution of geometric structures in intense turbulence** *NEW JOURNAL OF PHYSICS*
  Xu, H., Ouellette, N. T., Bodenschatz, E.
  2008; 10
- **Acceleration correlations and pressure structure functions in high-reynolds number turbulence** *PHYSICAL REVIEW LETTERS*
  Xu, H., Ouellette, N. T., Vincenzi, D., Bodenschatz, E.
  2007; 99 (20)
- **Curvature fields, topology, and the dynamics of spatiotemporal chaos** *PHYSICAL REVIEW LETTERS*
  Ouellette, N. T., Gollub, J. P.
  2007; 99 (19)
- **Curvature of Lagrangian trajectories in turbulence** *PHYSICAL REVIEW LETTERS*
  Xu, H., Ouellette, N. T., Bodenschatz, E.
  2007; 98 (5)
- **Multi-particle statistics - lines, shapes, and volumes in high Reynolds number turbulence** *PROCEEDINGS OF THE 5TH INTERNATIONAL CONFERENCE ON NONLINEAR MECHANICS*
  Xu, H., Ouellette, N. T., Bodenschatz, E.
  2007: 1155-1161
- **Experimental measurements of Lagrangian statistics in intense turbulence** *11th EUROMECH European Turbulence Conference*
  Xu, H., Ouellette, N. T., Nobach, H., Bodenschatz, E.
  SPRINGER-VERLAG BERLIN.2007: 1–10
- **Lagrangian particle tracking in high Reynolds number turbulence** *PARTICLE-LADEN FLOW: FROM GEOPHYSICAL TO KOLMOGOROV SCALES*
  Chang, K., Ouellette, N. T., Xu, H., Bodenschatz, E.
  2007; 11: 299-311
- **An experimental study of turbulent relative dispersion models** *NEW JOURNAL OF PHYSICS*
  Ouellette, N. T., Xu, H., Bourgoin, M., Bodenschatz, E.

2006; 8

- **Small-scale anisotropy in Lagrangian turbulence** *NEW JOURNAL OF PHYSICS*
  Ouellette, N. T., Xu, H., Bourgoin, M., Bodenschatz, E.
  2006; 8
- **Multifractal dimension of Lagrangian turbulence** *PHYSICAL REVIEW LETTERS*
  Xu, H. T., Ouellette, N. T., Bodenschatz, E.
  2006; 96 (11)
- **The role of pair dispersion in turbulent flow** *SCIENCE*
  Bourgoin, M., Ouellette, N. T., Xu, H. T., Berg, J., Bodenschatz, E.
  2006; 311 (5762): 835-838
- **A quantitative study of three-dimensional Lagrangian particle tracking algorithms** *EXPERIMENTS IN FLUIDS*
  Ouellette, N. T., Xu, H. T., Bodenschatz, E.
  2006; 40 (2): 301-313
- **High order Lagrangian velocity statistics in turbulence** *PHYSICAL REVIEW LETTERS*
  Xu, H., Bourgoin, M., Ouellette, N. T., Bodenschatz, E.
  2006; 96 (2)