

Di Qi

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Research Interests

- Data-driven modeling and machine learning for multiscale dynamics
- Theoretical and numerical analysis for complex turbulent systems
- Filtering, data assimilation, and information theory
- Statistical control and mean field games for multiscale flows
- Turbulent diffusion of passive tracers and extreme events
- Uncertainty quantification and model reduction methods

Academic Positions

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|------------|---|
| 2026 - | Associate Professor (with tenure)
DEPARTMENT OF MATHEMATICS, PURDUE UNIVERSITY |
| 2021 - | DEPARTMENT OF EARTH, ATMOSPHERIC, AND PLANETARY SCIENCES (BY COURTESY), PURDUE UNIVERSITY
INSTITUTE FOR A SUSTAINABLE FUTURE AND COMPUTATIONAL INTERDISCIPLINARY GRADUATE PROGRAM, PURDUE UNIVERSITY |
| 2021- 2026 | Assistant Professor
DEPARTMENT OF MATHEMATICS, PURDUE UNIVERSITY |
| 2017-2021 | Postdoctoral Fellow
COURANT INSTITUTE OF MATHEMATICAL SCIENCES, NEW YORK UNIVERSITY
<i>Mentor: Andrew J. Majda</i> |

Education

- | | |
|------|---|
| 2017 | PH.D. in Mathematics/Atmosphere and Ocean Science (with distinction)
COURANT INSTITUTE OF MATHEMATICAL SCIENCES, NEW YORK UNIVERSITY, NY, USA
<i>Advisor: Andrew J. Majda</i> |
| 2012 | B.S. in Mathematics (major) and Physics (minor)
SHANGHAI JIAO TONG UNIVERSITY, SHANGHAI, CHINA
<i>Advisor: Shi Jin</i> |

Thesis

D. Qi, *Strategies for Reduced-Order Models in Uncertainty Quantification of Complex Turbulent Dynamical Systems*. PhD Dissertation, New York University. May 2017.

Research Publications & Submissions

JOURNAL ARTICLES (* INDICATES THE CORRESPONDING AUTHOR)

Submitted & In preparation:

Feng, Q., Lai, R., Qi, D., and X. Ye (2026). Forward KL can be better: normalizing flow Boltzmann sampling with log-ratio variation. *in preparation*.

Qi, D., and Lai, R. (2026). Learn-to-evolve for data assimilation: self-supervised neural operator for nonlinear filtering. *in preparation*.

Qi, D., and Liu, C. (2026). An energetic variational formulation for nonlinear filtering with a bounded probability density. *in preparation*.

Xu, X., Qi, D., and Wang, C. (2026). The finite expression method for turbulent dynamics with high-order moment recovery. *submitted*.

Ye, X., Lin, G., Moya, C., and Qi, D. (2026). Jeffreys flow: robust Boltzmann generators for multi-modal distributions via distillation of parallel tempering. *submitted*.

Li, X., Liu, C., and Qi, D., (2025). High-order asymptotic models for coupled micro-macro systems at the fast relaxation limit. *submitted*.

Published:

Mohamad, M.A. and Qi, D. (2026). Resonance-driven intermittency and extreme events in turbulent scalar transport with a mean gradient. *Proceedings of the Royal Society A*, *accepted*.

Qi, D.* and Liu, J.-G. (2026). Data assimilation models for computing probability distributions of complex multiscale systems. *Journal of Computational Physics*, 545, 114465.

Qi, D.* and Liu, J.-G. (2025). Coupled stochastic-statistical equations for filtering multiscale turbulent systems. *Physica D: Nonlinear Phenomena*, 484, 135013.

Wang, Z., Chen, N., and Qi, D. (2025). A nonlinear data assimilation algorithm with closed-form approximations for multi-layer flow fields. *Monthly Weather Review*, 153(12), pp. 2889-2912.

Liu, J.-G. and Qi, D.* (2025). Oscillatory solutions at the continuum limit of Lorenz 96 systems. *Communications in Information and Systems*, 25(3), pp.551-587.

Gao, Y. and Qi, D.* (2025). Mean field games for controlling coherent structures in nonlinear fluid systems. *SIAM/ASA Journal on Uncertainty Quantification*, 13(4), pp.1681-1708.

- Cao, N. and Qi, D. (2024). The maintenance of coherent vortex topology by Lagrangian chaos in drift-Rossby wave turbulence. *Physics of Fluids*, 36(6).
- Qi, D.* (2024). Unambiguous models and machine learning strategies for anomalous extreme events in turbulent dynamical system. *Entropy*, 26(6), 522.
- Chen, N. and Qi, D.*. (2023). A physics-informed data-driven algorithm for ensemble forecast of complex turbulent systems. *Applied Mathematics and Computation*, 466, 128480.
- Qi, D.* and Liu, J.-G. (2023). High-order moment closure models with random batch method for efficient computation of multiscale turbulent systems. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 33, 103133.
- Covington, J., Qi, D., and Chen, N (2023). Effective statistical control strategies for complex turbulent dynamical systems. *Proceedings of the Royal Society A*, 479(2279), 20230546.
- Cao, N. and Qi, D. (2023). Nearly-integrable flows and chaotic tangles in the dimits shift regime of plasma edge turbulence. *Physics of Plasmas, Special Collection on Turbulence in Plasmas and Fluids*, 30(9).
- Qi, D.* and Harlim, J. (2023). A data-driven statistical-stochastic surrogate modeling strategy for complex nonlinear non-stationary dynamics. *Journal of Computational Physics*, 485, 112085.
- Qi, D.* and Liu, J.-G. (2023). A random batch method for efficient ensemble forecasts of multiscale turbulent systems. *Chaos: An Interdisciplinary Journal of Nonlinear Science* 33(2), 023113.
- Qi, D.* and Harlim, J. (2022). Machine learning-based statistical closure models for turbulent dynamical systems. *Philosophical Transactions of the Royal Society A* 380. no. 2229, 20210205
- Qi, D.* and Vanden-Eijnden, E. (2022). Anomalous statistics and large deviations of turbulent water waves past a step. *AIP Advances* 12(2), 025016.
- Qi, D.*, Majda, A.J., and Cerfon, A.J. (2021). Dimits shift, avalanche-like bursts, and solitary propagating structures in the two-field Flux-Balanced Hasegawa-Wakatani model for plasma edge turbulence (Featured article). *Physics of Plasmas*, 27(10), p.102304.
- Qi, D.* and Majda, A.J. (2021). Nonlinear interaction and turbulence transition in the limiting regimes of plasma edge turbulence. *Research in the Mathematical Sciences*, 7(3), 1-32.
- Moore, M.N.J., Bolles, C.T., Majda, A. J., and Qi, D. (2020). Anomalous waves triggered by abrupt depth changes: Laboratory experiments and truncated KdV statistical mechanics. *Journal of Nonlinear Science*.
- Qi, D.* and Majda, A.J. (2020). Flux-balanced two-field plasma edge turbulence in a channel geometry. *Physics of Plasmas*, 27(3), p.032304.
- Qi, D.* and Majda, A.J. (2020). Using machine learning to predict extreme events in complex systems. *Proceedings of the National Academy of Sciences*, 117(1), 52-59.
- Majda, A.J., and Qi, D.* (2019). Statistical phase transitions and extreme events in shallow water waves with an abrupt depth change. *Journal of Statistical Physics*, pp. 1-24.

- Majda, A.J., and Qi, D.* (2019). Linear and nonlinear statistical response theories with prototype applications to sensitivity analysis and statistical control of complex turbulent dynamical systems. *CHAOS: An Interdisciplinary Journal of Nonlinear Science*, 29(10), p. 103131.
- Qi, D., Majda, A.J., and Cerfon, A.J. (2019). A flux-balanced model for collisional plasma edge turbulence: numerical simulations with different aspect ratios. *Physics of Plasmas*, 26(8), p.082303.
- Qi, D.*, and Majda, A.J. (2019). Zonal jet creation from secondary instability of drift waves for plasma edge turbulence. *Chinese Annals of Mathematics, Series B*, 40(6), pp. 869-890.
- Qi, D.*, and Majda, A. J. (2019). Linking the two-field dynamics of plasma edge turbulence with the one-field balanced model through systematic unstable forcing at low resistivity. *Physics of Plasmas*, 26(5), p. 052108.
- Qi, D.*, and Majda, A.J. (2019). Transient metastability and selective decay for the coherent zonal structures in plasma edge turbulence. *Journal of Nonlinear Science*, pp. 1-43.
- Majda, A.J., and Qi, D.* (2019). Using statistical functionals for effective control of inhomogeneous complex turbulent dynamical systems. *Physica D: Nonlinear Phenomena*, 392, pp. 34-56.
- Majda, A.J., Moore, M.N.J., and Qi, D.* (2019). A statistical dynamical model to predict extreme events and anomalous features in shallow water waves with abrupt depth change. *Proceedings of the National Academy of Sciences*, 116(10), pp. 3982-3987.
- Majda, A.J., Qi, D., and Cerfon, A.J. (2018). A flux-balanced fluid model for collisional plasma edge turbulence: model derivation and basic physical features. *Physics of Plasmas*, 25(10), p.102307.
- Qi, D.*, and Majda, A.J. (2018). Rigorous statistical bounds in uncertainty quantification for one-layer turbulent geophysical flows. *Journal of Nonlinear Science*, 28(5), pp. 1709-1761.
- Qi, D.*, and Majda, A.J. (2018). Predicting extreme events for passive scalar turbulence in two-layer baroclinic flows through reduced-order stochastic models. *Communications in Mathematical Sciences*, 16(1), pp.17-51.
- Majda, A.J., and Qi, D.* (2018). Strategies for reduced-order models for predicting the statistical responses and uncertainty quantification in complex turbulent dynamical systems. *SIAM Review*, 60(3), 491-549.
- Majda, A.J., and Qi, D.* (2017). Effective control of complex turbulent dynamical systems through statistical functionals. *Proceedings of the National Academy of Sciences*, 114(22), pp. 5571-5576.
- Qi, D.*, and Majda, A.J. (2017). Low-dimensional reduced-order models for statistical response and uncertainty quantification: barotropic turbulence with topography. *Physica D: Nonlinear Phenomena*, 343, pp. 7-27.
- Lee, Y., Majda, A.J., and Qi, D. (2017). Preventing catastrophic filter divergence using adaptive additive inflation for baroclinic turbulence. *Monthly Weather Review*, 145(2), pp. 669-682.
- Qi, D.*, and Majda, A.J. (2016). Low-dimensional reduced-order models for statistical response and uncertainty quantification: two-layer baroclinic turbulence. *Journal of the Atmospheric Sciences*,

73(12), pp. 4609–4639.

Lee, Y., Majda, A.J., and Qi, D. (2016). Stochastic superparameterization and multiscale filtering of turbulent tracers. *Multiscale Modeling & Simulation*, 15(1), pp. 215–234.

Majda, A.J., and Qi, D.* (2016). Improving prediction skill of imperfect turbulent models through statistical response and information theory. *Journal of Nonlinear Science*, 26(1), pp. 233–285.

Qi, D.*, and Majda, A.J. (2015). Predicting fat-tailed intermittent probability distributions in passive scalar turbulence with imperfect models through empirical information theory. *Communications in Mathematical Sciences*, 14(6), pp. 1687–1722.

Qi, D.*, and Majda, A.J. (2015). Blended particle methods with adaptive subspaces for filtering turbulent dynamical systems. *Physica D: Nonlinear Phenomena*, 298, pp. 21–41.

Majda, A.J., Qi, D., and Sapsis, T.P. (2014) Blended particle filters for large-dimensional chaotic dynamical systems. *Proceedings of the National Academy of Sciences*, 111(21), pp. 7511–7516.

Teaching Experience

Fall 2026

Instructor

MA 425/525. Elements of Complex Analysis
Department of Mathematics, Purdue University

Spring 2026

Instructor

MA 615. Numerical Methods for Partial Differential Equations
MA 362. Topics in Vector Calculus
Department of Mathematics, Purdue University

Fall 2025

Instructor

MA 573. Numerical Solutions of Ordinary Differential Equations
Department of Mathematics, Purdue University

Spring 2025

Instructor

MA 595. Special Topics in Filtering Complex Fluid Systems
MA 362. Topics in Vector Calculus
Department of Mathematics, Purdue University

Fall 2024

Instructor

MA 504. Real Analysis
MA 598. Reading Course on Geophysical Fluid Dynamics
Department of Mathematics, Purdue University

Spring 2024

Instructor

MA 303. Differential Equations and PDE
Department of Mathematics, Purdue University

Fall 2023

Instructor

MA 573. Numerical Solutions of ODEs and dynamical systems

Department of Mathematics, Purdue University

Spring 2023	<i>Instructor</i> MA 510. Vector Calculus Department of Mathematics, Purdue University
Fall 2022	<i>Instructor</i> MA 35301. Linear Algebra II Department of Mathematics, Purdue University
Spring 2022	<i>Instructor</i> MA 303: Differential Equations and PDE Department of Mathematics, Purdue University
Fall 2019	<i>Instructor</i> Advanced Topics in Applied Math: Uncertainty Quantification In Turbulent Dynamical Systems Courant Institute, New York University
Fall 2018	<i>Instructor</i> Advanced Topics in Applied Math: Filtering Turbulent Signals in Complex Systems Courant Institute, New York University
Fall 2016	<i>Instructor</i> Advanced Topics in Applied Math: Turbulent Dynamical Systems Courant Institute, New York University
Fall 2015	<i>Co-Instructor</i> Advanced Topics in Applied Math: Quantifying Uncertainty in Complex Turbulent Systems Courant Institute, New York University
Fall 2014	<i>Co-Instructor</i> Advanced Topics in Applied Math: Filtering Turbulent Signals in Complex Systems Courant Institute, New York University

Students & Postdocs

POSTDOCS:

2026 - current	Lizuo Liu
2026 - current	Biraj Dahal (co-mentored with Yuan Gao)
2025 - current	Xuda Ye (co-mentored with Rongjie Lai)

GRADUATE STUDENTS:

2026 - current	Juan Martínez (Math)
2026 - current	Jinguang Chai (Math)
2025 - current	Aristha Deb (Math)
2024 - current	Jiarui Huang (Math)
2025 - current	Alejandro Cano (Math, co-advised with Andrew Toms)
2024 - 2025	

Zhilin Gong (EAPS, co-advised with Wen-wen Tung; current position: researcher at Arizona State University)

2024 - 2025 Rishabh Gupta (EAPS, co-advised with Wen-wen Tung; current position: eBay)

UNDERGRADUATE STUDENTS:

2025 - 2026 Juan José Martínez Castiblanco (current position: PhD student at the University of Florida)

2023 - 2025 Yufan Zhou (current position: PhD student at the Pennsylvania State University)

2023 - 2025 Vlada Volyanskaya (current position: industry)

2023 - 2025 Kabir Batra (current position: industry)

2022 - 2024 Shubham Shrivastava (current position: industry)

Grants & Research Support

Current PI, National Science Foundation (NSF), DMS-2407361, \$203,648, 2024 - 2027.
Reduced-Order Multiscale Models for Uncertainty Quantification, Data Assimilation and Control

Current PI, Office of Naval Research (ONR), N00014-24-1-2192, \$301,655, 2024 - 2027.
Analytically Tractable Strategies for Modeling Extreme Events and Anomalous Statistics in Turbulent Multiscale Systems

Current Co-PI, VPR Catalyst Grant, University of Calgary, Canada, \$12,750 CAD, 2025 - 2026.
Invariant-Measure Informed Forecasting of Chaotic Systems through Conservation Principles

Past PI, Office of Naval Research (ONR), N00014-26-1-2004, \$19,996, 2025.
Workshop on Scientific Machine Learning: Theory, Algorithms and Applications

Past Co-PI, National Science Foundation (NSF), OAC-2232872, \$494,600, 2022 - 2025.
CC Data Storage: Software Defined Storage for Composable and HPC Workflows*

Past PI, PCCRC Seed Grant, Purdue University, \$25,000, 2021 - 2023.
Innovative Solutions to Climate Problem and Long-term Impact

Past *Start-up Funds*, Purdue University, 2021 - 2026.

Professional Service

CONFERENCE & WORKSHOPS ORGANIZED:

12/2026 *Co-organizer*, AGU Fall meeting
Nonlinear Geophysics: Applied Mathematics Perspectives on Modern Geosciences

11/2026 *Co-organizer*, 2026 SIAM Conference on Mathematics of Data Science (MDS26)
Data-Driven Model Reduction and Scientific Machine Learning for Complex Systems

9/2026 *Co-organizer*, 2026 SIAM Great Lakes Section Annual Meeting (GLSIAM26)

9/2026 *Co-organizer*, Brin MRC Workshop
Mathematics of Dynamical Systems in Modern Machine Learning

5/2026

- Co-organizer*, JpGU-AGU Joint Meeting
Applied Math Perspectives on Modeling, Analyzing, and Predicting Complex Geophysical Systems
- 12/2025 *Co-organizer*, AGU Fall meeting
Applied Math Perspectives on Multiscale Complexity: Theory, Computation, and Extreme Events in Geophysical and Urban Systems
- 9/2025 *Organizer*, workshop on Scientific Machine Learning: Theory, Algorithms, and Applications, Purdue University
- 5/2025 *Co-organizer*, 2025 SIAM Conference on Dynamical Systems
Data Driven and Reduced-Order Methods in Dynamical Systems
- 12/2024 *Co-organizer*, AGU Fall meeting
Applied Math Perspectives on Modeling, Analyzing, and Predicting Complex Nonlinear Geophysical Systems
- 10/2024 *Co-organizer*, Materials Science & Technology
Advances in Multiphysics Modeling and Multi-modal Imaging of Functional Materials — Multi-modal Imaging of Functional Materials
- 7/2024 *Co-organizer*, World Congress on Computational Mechanics
Mini-symposium: Hybrid Techniques in Data-Driven Modeling, Forecasting, and Uncertainty Quantification of Transport-Dominated Complex Multiscale Phenomena
- 2/2024 *Co-organizer*, 2024 SIAM Conference on Uncertainty Quantification
Mini-symposium: Statistical and Data-Assisted Modeling Approaches for Forecasting and Uncertainty Quantification of Complex Multiscale Systems in Real-World Applications
- 12/2023 *Co-organizer*, AGU Fall meeting
Efficient Data-Driven Methods for Multiscale Stochastic Modeling and Uncertainty Quantification
- 8/2023 *Co-organizer*, ICIAM-Tokyo
Mini-symposium: Combining Machine Learning and Stochastic Methods for Modeling and Forecasting Complex Systems
- 5/2023 *Co-organizer*, 2023 SIAM Conference on Dynamical Systems
Mini-symposium: Reduced Order Modeling and Forecasting in Geophysical Flows and Complex Dynamical Systems
- 7/2022 *Co-organizer*, 2022 SIAM Annual Meeting
Mini-symposium: Data-driven Models and Machine Learning Strategies for Complex Dynamical Systems
- 3/2022 *Co-organizer*, AMS Spring Central Sectional Meeting
Special Session on Modeling and Forecasting Complex Turbulent Systems
- 12/2021 *Co-organizer*, AGU Fall Meeting
Advances in Computational Analysis in Geophysical Processes: Applied Mathematics Perspectives on Prediction, Uncertainty Quantification, and State Estimation

- 7/2019 Co-organizer, ICIAM-Valencia
Mini-symposium: State estimation, prediction, and uncertainty quantification in geophysics
- COMMITTEE & PANEL SERVICE:
- 2026 NSF CSSI Review Panel
2025 NSF DMS Review Panel
2025 - 2026 Graduate Committee, Engineering Services Committee, Computer Committee
- EDITORIAL SERVICE:
- 2026 Guest Editor in Machine Learning: Science and Technology Special Issue *Focus on Dynamical Systems and Mathematical Foundations of Modern Machine Learning*
2024 Guest Editor in Entropy Special Issue on *An Information-Theoretical Perspective on Complex Dynamical Systems*
- JOURNAL REFEREE:
- PNAS • Nature Communications • Scientific Reports • SIAM/ASA Journal on Uncertainty Quantification • Journal of Numerical Analysis • Discrete and Continuous Dynamical Systems • Physica D • SIAM Journal on Scientific Computing • Journal of Computational Physics • Multiscale Modeling and Simulation • Research in the Mathematical Sciences • Chaos: An Interdisciplinary Journal of Nonlinear Science • Journal of Plasma Physics • Philosophical Transactions A • Foundations of Data Science • Nonlinear Dynamics • Journal of Engineering Mathematics • The European Physical Journal ST • Entropy • Journal of the Atmospheric Sciences • Ocean Modelling • International Journal for Numerical Methods in Engineering • IEEE Access • Mathematics • Stats • Applied Sciences
- Reviewed the book “Physical Oceanography with Matlab” published by *Chapman & Hall/CRC Press*
- REVIEWER FOR MATHEMATICAL REVIEWS (AMS)
- SUPERVISING STUDENT RESEARCH:
- Goldwater fellowship review and nominee committee for evaluating outstanding undergraduate research applicants
- Ph.D./Masters Thesis Defense Committee of Naxian Ni (Math), Senwei Liang (Math), Gareth Hardwick (Math), Alim Karimi (EAPS), Chen Zhang (EAPS)
Ph.D. Advisory Committee Member of Naxian Ni (Math), Gareth Hardwick (Math), Ashwin Srinivasan (MECH), Ka-Ying Ho (EAPS), Xiangyu Liu (EAPS), Yikai Liu (EAPS), Zhaoyu Liu (EAPS)
PhD Qualifying Exam Committee of Jiaxing Li (Math), Hongli Li (Civil Engineering)
- Designed an undergraduate ISF-DUIRI research and learning project *Statistical and Deep Learning of High-Resolution Rainfall for Midwest Urban Sustainability Study*, 2023.
- Outstanding Student Presentation Award (OSPA) judge and liaison, American Geophysical Union Fall Meeting, 2021/2023/2024.

Conferences & Workshops

- 7/2026 *Reduced-order models for data assimilation and uncertainty quantification of multiscale turbulent systems*, the 15th AIMS Conference, Athens, Greece, July 2026.
- 5/2026 *Reduced order models for prediction and data assimilation of turbulent geophysical systems*, JpGU-AGU Joint Meeting, Chiba, Japan, May 2026.
- 5/2026 *Reduced-order models and data assimilation for prediction and uncertainty quantification of multiscale turbulent systems*, Capstone Conference: Mathematical Modeling for Renewable Energy and Environment, Pacific Institute for the Mathematical Sciences, Victoria, Canada, May 2026.
- 3/2026 *Data assimilation model for multiscale probability distributions of turbulent systems*, SIAM Conference on Uncertainty Quantification (UQ26), Minneapolis, March 2026.
- 12/2025 *Data assimilation models for computing probability distributions of turbulent geophysical systems*, AGU Fall Meeting, New Orleans, December 2026.
- 11/2025 *Reduced-order moment closure models for uncertainty quantification of multiscale complex systems*, 2025 SIAM NNP Section Conference, Pennsylvania State University, November 1, 2025.
- 10/2025 *Contemporary Issues and Future Opportunities in Applied Mathematics*, Brin MRC meeting, University of Maryland, October 2025.
- 7/2025 *Reduced-order models for filtering probability distributions of multiscale systems*, Third Joint SIAM/CAIMS Annual Meetings (AN25), Montréal, Québec, Canada, July 2025.
- 5/2025 *Ensemble prediction and data assimilation using reduced order models*, workshop on MJO predictability at Banff, BIRS, Canada, May 2025.
- 5/2025 *A moment closure model for coupled micro-macro systems*, SIAM Conference on Dynamical Systems (DS25), Denver, Colorado, May 2025.
- 5/2025 *Data assimilation models for computing probability distributions of complex multiscale systems*, NSF CompMath Meeting 2025, University of Utah, Salt Lake City, May 2025.
- 3/2025 *Data-driven strategies for reduced-order closure models in turbulent systems*, Southeastern Atlantic Section of SIAM Section Meeting (SIAM-SEAS25), Knoxville, Tennessee, March 2025.
- 12/2024 *Filtering and control of multiscale turbulent systems*, 14th American Institute of Mathematical Sciences (AIMS) conference, Abu Dhabi, UAE, December, 2024.
- 12/2023 *Coupled stochastic-statistical equations for filtering turbulent geophysical systems*, AGU Fall Meeting, Washington, D.C., December 2024.
- 10/2024 *A data-driven statistical-stochastic model for multiscale turbulent systems*, SIAM Conference on Mathematics of Data Science (MDS24), Atlanta, GA, October 2024.
- 7/2024 *Reduced-order closure models with random batch method for multiscale turbulent systems*, 11th European Nonlinear Dynamics Conference (ENOC2024), Delft, Netherlands, July 2024.

- 7/2024 *Reduced-order models for data assimilation and control of multiscale turbulent systems*, SIAM Annual Meeting (AN24), Spokane, WA, July 2024.
- 2/2024 *Reduced-order moment closure models with random batch method for complex multiscale systems*, SIAM Conference on Uncertainty Quantification (UQ24), Trieste, Italy, February 2024.
- 12/2023 *Statistical reduced-order models and closure strategies for turbulent geophysical flows*, AGU Fall Meeting, San Francisco, CA, December 2023.
- 5/2023 *Statistical reduced-order models and data-driven closure strategies for turbulent systems*, SIAM Conference on Dynamical Systems (DS23), Portland, OR, May 2023.
- 3/2023 *Reduced-order models and data-driven closure strategies for turbulent systems*, Mathematical Approaches of Atmospheric Constituents Data Assimilation and Inverse Modeling, BIRS, Canada, March 2023.
- 12/2022 *Data-driven statistical-stochastic model for effective ensemble forecast of complex systems*, AGU Fall Meeting, Chicago, IL, December 2022.
- 11/2022 *Statistical reduced-order models and data-driven closure strategies for turbulent systems*, Machine Learning for Climate and Weather Applications, IMSI Workshop, Chicago, IL, November 2022.
- 7/2022 *Statistical reduced-order models and closure strategies for turbulent systems*, SIAM Conference on Mathematics of Planet Earth (MPE22), Pittsburgh, PA, July 2022.
- 4/2022 *Reduced-order models and machine learning-based closure for turbulent systems*, SIAM Conference on Uncertainty Quantification (UQ22), Atlanta, GA, April 2022.
- 3/2022 *Predicting extreme events and anomalous statistics of turbulent water waves*, AMS Spring Central Meeting, West Lafayette, IN, March 2022.
- 12/2021 *Statistical reduced-order models and closure strategies for turbulent geophysical flows*, AGU Fall Meeting, New Orleans, LA, December 2021.
- 7/2021 *Suppression of turbulent transport by zonal flows in magnetized plasmas (virtual)*, SIAM Annual Meeting (AN21), July 2021.
- 1/2021 CIB-EPFL workshop: Linear Response: Rigorous Results and Applications (virtual), January 2021.
- 12/2019 *Statistical reduced models for uncertainty quantification of turbulent geophysical flows*, AGU Fall Meeting, San Francisco, CA, December 2019.
- 10/2019 *Transition from drift wave turbulence to coherent zonal structures in plasma edge turbulence*, 61st Annual Meeting of the APS Division of Plasma Physics (DPP), Fort Lauderdale, Florida, October 2019.
- 7/2019 *Statistical reduced models and rigorous analysis for uncertainty quantification of turbulent geophysical flows*, Scientific Grand Challenges and New Perspectives in Applied Mathematics: Ocean, Atmosphere and Climate Sciences, University of Victoria, Canada, July 2019.
- 7/2019

Reduced-order statistical models for predicting statistical responses and extreme events in geophysics, International Congress on Industrial and Applied Mathematics, Valencia, Spain, July 2019.

- 5/2019 *Reduced-order statistical models for predicting mean responses and extreme events in barotropic turbulence*, SIAM Conference on Applications of Dynamical Systems (DS19), Snowbird, Utah, May 2019.
- 5/2019 *Rigorous statistical bounds in uncertainty quantification for turbulent geophysical flows*, Workshop on Data Assimilation: Methodology and Applications, Centre de Recherches Mathématiques (CRM), Université de Montréal, Canada, May 2019.
- 3/2019 *Statistical reduced models and rigorous analysis for uncertainty quantification of turbulent geophysical flows*, A Conference to Celebrate the 70th Birthday of Andrew Majda, Courant Institute, New York, NY, March 2019.
- 12/2018 *Statistical bounds for turbulent geophysical flows in uncertainty quantification*, Nonlinear PDEs from Oceanic and Atmospheric Dynamics and Related Topics, Guangzhou, China, December 2018.
- 12/2018 *Rigorous statistical bounds in uncertainty quantification for turbulent geophysical flows*, Applied Mathematics and Statistics Youth Forum, Peking University, Beijing, China, December 2018.
- 7/2018 *Statistical Response in Uncertainty Quantification through Reduced-order Models*, SIAM Annual Meeting, Portland, OR, July 2018.
- 4/2018 *Predicting Statistical Responses and Extreme Events in Turbulent Systems through Low-Dimensional Reduced-Order Models*, SIAM Conference on Uncertainty Quantification, Garden Grove, CA, April 2018.
- 12/2017 *Low-Dimensional Reduced-Order Models for Statistical Response and Uncertainty Quantification in Turbulent Systems*, AGU Fall Meeting, New Orleans, LA, December 2017.
- 5/2017 *Predicting Extreme Events for Passive Scalar Turbulence through Reduced-Order Models*, SIAM Conference on Applications of Dynamical Systems (DS17), Snowbird, Utah, May 2017.
- 12/2016 *Statistical Response in Two-layer Baroclinic Turbulence for Uncertainty Quantification* (Poster), AGU Fall Meeting, San Francisco, CA, December 2016.
- 10/2016 *Low-Dimensional Reduced-Order Models for Statistical Response and Uncertainty Quantification*, MURI 2016 workshop, New York University, October 2016.
- 5/2016 *Preventing Catastrophic Filter Divergence Using Adaptive Additive Inflation for Baroclinic Turbulence* (Poster), The seventh EnKF Data Assimilation Workshop, State College, PA, May 2016.
- 4/2016 *Improving Prediction Skill of Imperfect Turbulent Models through Empirical Information Theory*, SIAM Conference on Uncertainty Quantification, EPFL, Lausanne, Switzerland, April 2016.
- 8/2015 *Blended Particle Filters for Large Dimensional Chaotic Dynamical Systems*, Mathematics of Geophysical Flows and Turbulence, Fudan University, Shanghai, August 2015.
- 8/2015 *Improving prediction skill of imperfect turbulent models through statistical response and information theory*, Mathematics of Geophysical Flows and Turbulence, Fudan University, Shanghai, August 2015.

2015.

- 8/2015 *Developing Imperfect Turbulent Models through Statistical Response and Information Theory*, The eighth International Congress on Industrial and Applied Mathematics, Beijing, China, August 2015.
- 6/2014 *Filtering Turbulent Signals in Fourier Space: Fourier Domain Kalman Filter*, Short Course in High Dimensional Filtering, University of Warwick, UK, June 2014.
- 3/2014 *Blended Particle Filters for Large Dimensional Chaotic Dynamical Systems*, SIAM Conference on Uncertainty Quantification, Savannah, Georgia, March 2014.
- 1/2014 *Blended Particle Filters for Large Dimensional Chaotic Dynamical Systems*, MURI 2014 workshop, New York University, NY, January 2014.

Colloquium & Seminar Talks

- 9/2026 *Self-supervised neural operators for nonlinear filtering of complex turbulent systems*, Departmental Colloquium, the University of Alabama, September 2026.
- 7/2026 *Reduced-order models and data assimilation for prediction and uncertainty quantification of multi-scale turbulent systems*, GE Aerospace Research Sustainability Seminar Series, July 2026.
- 3/2026 *Reduced-order data assimilation models for computing probability distributions of complex multiscale systems*, Applied Mathematics Seminar, University of Notre Dame, March 2026.
- 2/2026 *Reduced-order data assimilation models for computing probability distributions of complex multiscale systems*, Applied Mathematics Seminar, University at Buffalo, February 2026.
- 11/2025 *Reduced-order data assimilation models for computing probability distributions of complex multiscale systems*, ACM Seminar, Georgia Institute of Technology, November 2025.
- 9/2025 *Data assimilation methods for predicting probability distributions of complex multiscale systems*, Applied Math & Analysis Seminar, Duke University, September 2025.
- 4/2025 *Mean field control for multiscale turbulent geophysical flows*, Seminar on Applied and Numerical Analysis, University of Florida, April 2025.
- 3/2025 *Reduced-order moment closure models for uncertainty quantification and data assimilation*, Data Science Seminar, University of Minnesota, March 2025.
- 9/2024 *Statistical-stochastic model for filtering turbulent phenomena*, Applied Physics and Applied Mathematics, Columbia University, November 2024.
- 3/2024 *Random batch methods for multiscale complex systems*, Applied and Computational Math Seminar, University of Wisconsin-Madison, March 2024.
- 12/2023 *Reduced-order models and closure strategies for turbulent systems*, CCAM Seminar, December 2023.
- 7/2023

Reduced-order closure models and ensemble methods for complex multiscale systems, AI + Math Colloquia, Shanghai Jiao Tong University, July 2023.

- 11/2022 *Reduced-order models and data-driven closure strategies for turbulent systems*, Applied Math & Analysis Seminar, Duke University, November 2022.
- 3/2022 *Statistical reduced-order models and machine learning-based closure strategies for turbulent dynamical systems*, Numerical Analysis Seminar, North Carolina State University, March 2022.
- 3/2022 *Predicting extreme events and anomalous features in complex turbulent systems*, Bridge to Research Seminar, Purdue University, March 2022.
- 11/2021 *Research conservation: stochastic models for turbulence*, PCCRC, Purdue University, November 2021.
- 11/2021 *Statistical reduced-order models and closure strategies for turbulent geophysical flows*, Storm Snacks, EAPS, Purdue University, November 2021.
- 10/2021 *Statistical reduced-order models and closure strategies for turbulent dynamical systems*, Mathematics Colloquium, United States Naval Academy, October 2021.
- 9/2021 *Statistical reduced models and rigorous analysis for uncertainty quantification in turbulent dynamical systems*, CCAM Seminar, Purdue University, September 2021.
- 4/2021 *Creation of coherent zonal structures from selective decay and secondary instability (virtual)*, Applied Analysis Group Seminar, University of Bremen, April 2021.
- 3/2021 *Predicting extreme events and anomalous features using a statistical dynamical model and machine learning (virtual)*, Institute of Natural Sciences, Shanghai Jiao Tong University, March 2021.
- 2/2020 *Predicting extreme events and anomalous features using a statistical dynamical model and machine learning*, Special Data Science Colloquium, Purdue University.
- 1/2020 *Predicting extreme events and anomalous features using a statistical dynamical model and machine learning*, Computational and Applied Mathematics Colloquium, Penn State.
- 1/2020 *Statistical reduced models and rigorous analysis for uncertainty quantification of turbulent dynamical systems*, Mathematics Colloquium, University of Illinois at Urbana-Champaign.
- 12/2019 *Statistical reduced models and rigorous analysis for uncertainty quantification of turbulent dynamical systems*, Mathematics Colloquium, University at Buffalo, SUNY.
- 4/2019 *Statistical reduced models and rigorous analysis for uncertainty quantification of turbulent geophysical flows*, Mathematical Sciences Colloquium, Rensselaer Polytechnic Institute.
- 4/2019 *Creation of coherent zonal structures from selective decay and secondary instability*, Atmosphere Ocean Science Colloquium, Courant Institute.
- 10/2018 *Rigorous statistical bounds in uncertainty quantification for turbulent geophysical flows*, Graduate Student / Postdoc Seminar, Courant Institute.
- 5/2017

Predicting Extreme Events for Passive Scalar Turbulence through Reduced-Order Models, CAOS Student Seminar, Courant Institute

2/2016 *Low-Dimensional Reduced-Order Models for Statistical Response and UQ*, CAOS Student Seminar, Courant Institute.

2/2015 *Improving Prediction Skill of Imperfect Turbulent Models through Statistical Response and Information Theory*, CAOS Student Seminar, Courant Institute.

2/2014 *Blended Particle Filter for Large Dimensional Chaotic Dynamical Systems*, CAOS Student Seminar, Courant Institute.

10/2013 *Statistical Dynamics For Uncertainty Quantification Of Quadratic System*, CAOS Monday Lunch Seminar.

8/2013 *Filtering Linear Systems and Observability*, Summer Discussion Group, Courant Institute.

4/2013 *Blended reduced subspace algorithms for uncertainty quantification*, CAOS Student Seminar, Courant Institute.

Press Release

11/2018 Strategies for Predicting Statistical Responses in Complex Turbulent Systems
CAOS News & Research
<https://caos.cims.nyu.edu/dynamic/news/10/>

Honors & Awards

2018 New World Mathematics Awards for Doctor Thesis
2017 Kurt O. Friedrichs prize for an outstanding dissertation in mathematics, New York University
2012–2017 New York University MacCracken Graduate Scholarship, New York University
2011 China Undergraduate Mathematical Contest in Modeling (first Class Prize)
2010 Mathematical Contest in Modeling (Meritorious Winner)
2008–2010 Academic Excellence Scholarship (A class), Shanghai Jiao Tong University
2008 Samsung scholarship (1st Class), Shanghai Jiao Tong University