

Jinlong Wu

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Education

Sep. 2014-Sep. 2018	Virginia Tech Major: Aerospace Engineering (Advisor: Prof. Heng Xiao)	Ph.D.
Sep. 2011-Jun. 2014	Southeast University, China Major: Power Engineering	Master
Sep. 2007-Jun. 2011	Southeast University, China Major: Thermal Energy and Power Engineering	Bachelor

Work Experiences

Aug. 2022-present	Department of Mechanical Engineering	Assistant Professor
Mar. 2023-present	Data Science Institute University of Wisconsin-Madison	Affiliated Faculty
Aug. 2021-July. 2022	California Institute of Technology Supervisors: Prof. Andrew Stuart, Prof. Tapio Schneider	Research Scientist
Jan. 2019-July. 2021	California Institute of Technology Supervisors: Prof. Andrew Stuart, Prof. Tapio Schneider	Postdoctoral Scholar
Sep. 2018-Dec. 2018	University of California, Los Angeles Host: Institute for Pure and Applied Mathematics	Visiting Scholar
May. 2018-Aug. 2018	Lawrence Berkeley National Laboratory Mentors: Dr. Karthik Kashinath, Dr. Adrian Albert Supervisor: Dr. Prabhat Ram	Summer Intern

Research Interests

Scientific Machine Learning, Computational Fluid Dynamics, Turbulence, Data Assimilation, Stochastic Processes, Bayesian Inference, Uncertainty Quantification, Inverse Problems, Multiscale Modeling, Complex Engineering Systems

Publications^a

Journal Papers

- X. Dong, H. Yang, **J.-L. Wu**, “Stochastic and Non-local Closure Modeling for Nonlinear Dynamical Systems via Latent Score-based Generative Models”. *Journal of Computational Physics* (2026).
- H. Yang, X. Dong, **J.-L. Wu**, “Bayesian Experimental Design for Model Discrepancy Calibration: An Auto-Differentiable Ensemble Kalman Inversion Approach”. *Journal of Computational Physics* (2025).

^a More details can be found on my [Google Scholar Profile](#).

- C. Chen, Z. Wang, N. Chen, **J.-L. Wu**, “Modeling partially observed nonlinear dynamical systems and efficient data assimilation via discrete-time conditional Gaussian Koopman network”. *Computer Methods in Applied Mechanics and Engineering* (2025).
- X. Dong, C. Chen, **J.-L. Wu**, “Data-Driven Stochastic Closure Modeling via Conditional Diffusion Model and Neural Operator”. *Journal of Computational Physics* (2025).
- H. Yang, C. Chen, **J.-L. Wu**, “Active Learning of Model Discrepancy with Sequential Optimal Experimental Design”. *Computer Methods in Applied Mechanics and Engineering* (2025).
- C. Chen, Y.-L. Zhang, N. Chen, **J.-L. Wu**, “CGKN: A Deep Learning Framework for Modeling Complex Dynamical Systems and Efficient Data Assimilation”. *Journal of Computational Physics* (2024).
- Y.-F. Guan, P. Hassanzadeh, T. Schneider, O. Dunbar, Z.-Y. Huang, **J.-L. Wu**, I. Lopez-Gomez, “Online learning of eddy-viscosity and backscattering closures for geophysical turbulence using ensemble Kalman inversion”. Submitted to *Journal of Fluid Mechanics Rapids* (2024).
- C. Chen, **J.-L. Wu**, “Neural Dynamical Operator: Continuous Spatial-Temporal Model with Gradient-Based and Derivative-Free Optimization Methods”. *Journal of Computational Physics* (2024).
- C. Chen, N. Chen, **J.-L. Wu**, “CGNSDE: Conditional Gaussian Neural Stochastic Differential Equation for Modeling Complex Systems and Data Assimilation”. *Computer Physics Communications* (2024).
- J. Wang, S. Wang, H. Unjhwala, **J.-L. Wu**, D. Negrut, “MBD-NODE: physics-informed data-driven modeling and simulation of constrained multibody systems”. *Multibody System Dynamics* (2024).
- H. Unjhwala, T. Hansen, H. Zhang, S. Caldraru, S. Chatterjee, L. Bakke, **J.-L. Wu**, R. Serban, D. Negrut, “An expeditious and expressive vehicle dynamics model for applications in controls and reinforcement learning”. *IEEE Access* (2024).
- **J.-L. Wu**, M. Levine, T. Schneider, A. Stuart, “Learning About Structural Errors in Models of Complex Dynamical Systems”. *Journal of Computational Physics* (2023).
- C. Chen, N. Chen, **J.-L. Wu**, “CEBoosting: Online Sparse Identification of Dynamical Systems with Regime Switching by Causation Entropy Boosting”. *Chaos* (2023).
- H.M. Unjhwala, R. Zhang, W. Hu, **J.-L. Wu**, R. Serban, D. Negrut, “Using a Bayesian-Inference Approach to Calibrating Models for Simulation in Robotics”. *Journal of Computational and Nonlinear Dynamics* (2023).
- R. Oliver, I. Lopez-Gomez, A. Garbuno-Iñigo, D.Z. Huang, E. Bach, **J.-L. Wu**, “EnsembleKalmanProcesses.jl: Derivative-free ensemble-based model calibration”. *Journal of Open Source Software* (2022).
- T. Schneider, A.M. Stuart, **J.-L. Wu**^b, “Ensemble Kalman Inversion for Sparse Learning of Dynamical Systems from Time-Averaged Data”. *Journal of Computational Physics* (2022).
- T. Schneider, O. Dunbar, **J.-L. Wu**, L. Bottcher, D. Burov, A. Garbuno-Inigo, G. Wagner, S. Pei, C. Daraio, R. Ferrari, J. Shaman, “Epidemic Management and Control Through Risk-Dependent Individual Contact Interventions”. *PLOS Computational Biology* (2022).
- T. Schneider, A.M. Stuart, **J.-L. Wu**^b, “Learning Stochastic Closures Using Ensemble Kalman Inversion”. *Transactions of Mathematics and Its Applications* (2021).
- K. Kashinath, M. Mustafa, A. Albert, **J.-L. Wu**, et al., “Physics-Informed Machine Learning: Case Studies for Weather and Climate Modeling”. *Philosophical Transactions of the Royal Society A* (2021).
- Y. Zeng, **J.-L. Wu**, H. Xiao, “Enforcing Deterministic Constraints on Generative Adversarial Networks for Emulating Physical Systems”, *Communications in Computational Physics* (2021).
- **J.-L. Wu**, K. Kashinath, A. Albert, D. Chirila, Prabhat, H. Xiao. “Enforcing Statistical Constraints in Generative Adversarial Networks for Modeling Chaotic Dynamical Systems”. *Journal of Computational Physics* (2020).

^b Author names are listed alphabetically.

- H. Xiao, **J.-L. Wu**, S. Laizet, L. Duan, “Flows Over Periodic Hills of Parameterized Geometries: Datasets for Data-Driven Turbulence Modeling from Direct Simulations”. *Computers & Fluids* (2020).
- **J.-L. Wu**, H. Xiao, R. Sun, Qiqi Wang. “Reynolds-Averaged Navier-Stokes Equations with Explicit Data-Driven Reynolds Stress Closure Can Be Ill-Conditioned”. *Journal of Fluid Mechanics* (2019).
- **J.-L. Wu**, R. Sun, S. Laizet, H. Xiao. "Representation of Stress Tensor Perturbations with Application in Machine-Learning-Assisted Turbulence Modeling". *Computer Methods in Applied Mechanics and Engineering*, (2019).
- **J.-L. Wu**, C. Michelen, H. Xiao. “Physics-Informed Covariance Kernel for Model-Form Uncertainty Quantification with Application to Turbulent Flows”. *Computers & Fluids* (2019).
- C. Michelen, **J.-L. Wu**, H. Xiao, E. Paterson. “Data-Driven, Physics-Based Feature Extraction from Fluid Flow Fields Using Convolutional Neural Networks”. *Communications in Computational Physics*, (2019).
- X.-L. Zhang, **J.-L. Wu**, O. Coutier-Delgosha, H. Xiao, “Recent Progress in Augmenting Turbulence Models with Physics-Informed Machine Learning”. *Journal of Hydrodynamics*, (2019).
- **J.-L. Wu**, H. Xiao, E. Paterson. “Physics-Informed Machine Learning Approach for Augmenting Turbulence Models: A Comprehensive Framework”. *Physical Review Fluids* (2018).
- **J.-L. Wu**, X.-L. Yin, H. Xiao. “Seeing Transport Properties from Images: Fast Prediction of Porous Media Permeability with Convolutional Neural Networks”. *Science Bulletin* (2018).
- **J.-L. Wu**, J.-X. Wang, H. Xiao, J. Ling. “A Priori Assessment of Prediction Confidence for Data-Driven Turbulence Modeling”. *Flow, Turbulence and Combustion* (2017).
- J.-X. Wang, **J.-L. Wu**, H. Xiao. “Physics-Informed Machine Learning Approach for Reconstructing Reynolds Stress Modeling Discrepancies Based on DNS Data”. *Physical Review Fluids* (2017).
- **J.-L. Wu**, J.-X. Wang, H. Xiao. “A Bayesian Calibration–Prediction Method for Reducing Model-Form Uncertainties with Application in RANS Simulations”. *Flow, Turbulence and Combustion* (2016).
- H. Xiao, **J.-L. Wu**, J.-X. Wang, R. Sun, C.J. Roy. “Quantifying and Reducing Model-Form Uncertainties in Reynolds-Averaged Navier–Stokes Simulations: A Data-Driven, Physics-Informed Bayesian Approach”. *Journal of Computational Physics* (2016).
- J.-X. Wang, **J.-L. Wu**, H. Xiao. “Incorporating Prior Knowledge for Quantifying and Reducing Model-Form Uncertainties in RANS Simulations”. *International Journal for Uncertainty Quantification* (2016).

Conference Papers

- **J.-L. Wu**, J.-X. Wang, H. Xiao, and J. Ling, “Visualization of High Dimensional Turbulence Simulation Data Using t-SNE”, 19th AIAA Non-Deterministic Approaches Conference. Grapevine, TX, 2017.
- H. Xiao, **J.-L. Wu**, J.-X. Wang, E. Paterson. “Physics-Informed Machine Learning for Predictive Turbulence Modeling: Progress and Perspectives”, AIAA SciTech Meeting. Grapevine, TX, 2017.
- J.-X. Wang, **J.-L. Wu**, J. Ling, G. Iaccarino, H. Xiao, “Physics-Informed Machine Learning for Predictive Turbulence Modeling: Toward a Complete Framework”, tech. rep., Proceedings of Summer Research Program, Center of Turbulence Research, Stanford University, Stanford, CA, USA, 2016.

Presentations

Invited Talks

- **J.-L. Wu**. Learning Stochastic Closure Models for Complex Dynamical Systems USACM UQ Seminar, Apr. 2026
- **J.-L. Wu**. Data-driven Structural Error Models for Complex Dynamical Systems Caltech, Feb. 2025

- **J.-L. Wu.** Operator learning for data-driven closure models of complex dynamical systems. Fluids and ML workshop at UW-Madison, Jun. 2024
- **J.-L. Wu.** Operator learning for data-driven closure models of complex dynamical systems. Iowa State University, May 2024
- **J.-L. Wu.** Data-Driven Closure Modeling Using Derivative-free Kalman Methods. Lawrence Livermore National Laboratory, Oct. 2023
- **J.-L. Wu.** Data-Driven Closure Modeling with Limited Data. Argonne National Laboratory, Jun. 2023
- **J.-L. Wu.** Data-Driven Closure Modeling Using Derivative-Free Kalman Methods. University of Iowa, Oct. 2022
- **J.-L. Wu.** Data-Driven Closure Modeling Using Derivative-free Kalman Methods. Alan Turing Institute, Jul. 2022
- **J.-L. Wu.** Data-Driven Closure Modeling Using Derivative-free Kalman Methods. Southeast University, Jun. 2022
- **J.-L. Wu.** Closure Modeling of Dynamical Systems Using Bayesian Inference and Physics-Informed Machine Learning. Google Research, Aug. 2021
- **J.-L. Wu, J.-X. Wang, H. Xiao.** Physics-Informed Machine Learning for Turbulence Modeling. UT Austin, Jun. 2019
- **J.-L. Wu, J.-X. Wang, H. Xiao.** Predictive Turbulence Modeling with Bayesian Inference and Physics-Informed Machine Learning. Heidelberg, May. 2019
- **J.-L. Wu, J.-X. Wang, H. Xiao.** Data-Driven Turbulence Modeling with Bayesian Inference and Physics-Informed Machine Learning. UCLA, Nov. 2018
- **J.-L. Wu, J.-X. Wang, H. Xiao.** Predictive Turbulence Modeling with Bayesian Inference and Physics-Informed Machine Learning. Caltech, Oct. 2018

Selected Conference Talks

- **J.-L. Wu.** Data-Driven Closure Modeling Using Derivative-Free Kalman Methods. SIAM DS, May 2025
- X. Dong, C. Chen, **J.-L. Wu.** Data-Driven Modeling for Stochastic Closures of Complex Dynamical Systems. SIAM CSE, Mar. 2025
- C. Chen, Y. Zhang, N. Chen, **J.-L. Wu.** Conditional Gaussian Koopman Network for Modeling Complex Systems and Data Assimilation. APS DFD, Nov. 2024
- X. Dong, C. Chen, **J.-L. Wu.** Data-Driven Modeling for Stochastic Closures of Complex Dynamical Systems. SIAM UQ, Mar. 2024
- C. Chen, N. Chen, **J.-L. Wu.** Online Sparse Identification of Dynamical Systems with Regime Switching by Causation Entropy Boosting. APS DFD, Nov 2023
- **J.-L. Wu, T. Schneider, A. Stuart.** Learning Stochastic Closures Using Sparsity-Promoting Ensemble Kalman Inversion. SIAM MDS, Sep. 2022
- **J.-L. Wu, Z. Huang, Z. Shen, T. Schneider, A. Stuart.** Data-driven modeling of non-local mixing phenomena in geophysical flows. APS DFD, Nov. 2021
- **J.-L. Wu, T. Schneider, A. Stuart.** Estimating model error using sparsity-promoting ensemble Kalman inversion. APS DFD, Nov. 2020
- **J.-L. Wu, Y. Zeng, K. Kashinath, A. Albert, Prabhat, H. Xiao.** Enforcing Physical Constraints in Machine Learning with Application to Fluid Flows. SIAM CSE, Feb. 2019
- **J.-L. Wu, Y. Zeng, K. Kashinath, A. Albert, Prabhat, H. Xiao.** Physics-Informed Generative Learning to Predict Unresolved Physics in Complex Systems. APS DFD, Nov. 2018

- **J.-L. Wu**, C. Michelen, J.-X. Wang, H. Xiao. Reducing Model Discrepancies in Turbulent Flow Simulations with Physics-informed Machine Learning. SIAM UQ, Apr. 2018
- **J.-L. Wu**, R. Run, Q.-Q. Wang, H. Xiao. On the Conditioning of Machine-Learning-Assisted Turbulence Modeling. APS DFD, Nov. 2017
- **J.-L. Wu**, J.-X. Wang, H. Xiao. Reducing Model Discrepancy in Turbulent Flow Simulations: A Physics-Informed Machine Learning Approach. SIAM CSE, Feb. 2017

Teaching Experiences

University of Wisconsin-Madison

- ME 363: Fluid Dynamics Fall 2023, Fall 2024, Fall 2025
- ME 563: Intermediate Fluid Dynamics Spring 2023
- ME 964: Scientific Computing and Machine Learning for Engineering Fall 2022, Fall 2023

Journal Review Experiences

- Nature Communications
- Nature Computational Science
- Physical Review Letters
- Computer Methods in Applied Mechanics and Engineering
- Journal of Fluid Mechanics
- SIAM Journal on Scientific Computing
- Water Resources Research
- Nature Machine Learning Intelligence
- Scientific Reports
- Journal of Computational Physics
- Journal of Advances in Modeling Earth Systems
- Physical Review Fluids
- Physical Review E
- Journal of Verification, Validation and Uncertainty Quantification
- Advanced Powder Technology
- Communications in Computational Physics
- Flow, Turbulence and Combustion
- Aerospace Science and Technology

Workshops and Symposia

- Minisymposium at SIAM Uncertainty Quantification 2026 (co-organize with Prof. Ching-Yao Lai) Mar. 2026
- Special Session at 14th American Institute of Mathematical Sciences (AIMS) Conference (co-organize with Prof. Nan Chen) Dec. 2024
- Minisymposium at SIAM Uncertainty Quantification 2024 (co-organize with Prof. Xin T. Tong) Mar. 2024
- Minisymposium at International Congress on Industrial and Applied Mathematics (co-organize with Prof. Peng Chen) Aug. 2023
- Minisymposium at SIAM Mathematics of Data Science 2022 (co-organize with Dr. Daniel Huang) Sep. 2022
- Minisymposium at SIAM Mathematics for Planetary Earth 2020 (co-organize with Dr. Yair Cohen) Aug. 2020
- Machine Learning for Geosciences Workshop at AGU Fall Meeting 2019 (instructor) Dec. 2019

Memberships

- Tau Beta Pi the Engineering Honor Society, Member 2016-present
- Society for Industrial and Applied Mathematics, Member 2016-present
- American Physical Society, Member 2015-present
- American Society of Mechanical Engineers, Member 2022-present