Yuhua Zhu

CONTACT INFORMATION

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EMPLOYMENT

University of California - San Diego, La Jolla, CA

Assistant Professor, Jul. 2022 – present
Department of Mathematics and Halıcıoğlu Data Science Institute

Stanford University, Stanford, CA

Postdoc Scholar, Mathematics, Aug. 2019 – June. 2022
Mentor: **Lexing Ying**

Simons Institute, Berkeley, CA

Long-Term Participant, Geometric Methods in Optimization and Sampling, Aug. – Dec. 2021

EDUCATION

University of Wisconsin-Madison, Madison, WI

Ph.D. Candidate, Mathematics, Jul. 2015 – May 2019
Adviser: **Shi Jin**

M.A., Mathematics, Sep. 2014 – May 2015

Shanghai Jiao Tong University, Shanghai, China

B.S., Mathematics, *Graduation with High Distinction*, Sep. 2010 – Jun. 2014

RESEARCH INTERESTS

Interface of PDEs and optimization algorithms;
Interface of PDEs and sequential decision-making;
Numerical and uncertain aspects of kinetic and hyperbolic equations;
High dimensional and multiscale computations for physical and biological problems;

PUBLISHED

Xun Tang, Lexing Ying and **Yuhua Zhu***. 2023. Operator Shifting for Model-based Policy Evaluation. *Commun. Math. Sci.*

Yuhua Zhu and Lexing Ying. 2023. Variational Actor-Critic Algorithms. *ESAIM: COCV.*

Shi Jin, **Yuhua Zhu*** and Enrique Zuazua. 2022. The Vlasov Fokker Planck Equation with High Dimensional Parametric Forcing Term. *Numer. Math., 150(2):479–519*

Yuhua Zhu, Lexing Ying and Zachary Izzo. 2022. Borrowing From the Future: Addressing Double Sampling in Model-free Control. *Mathematical and Scientific Machine Learning, PMLR, pages 1099–1136. PMLR.*

Lexing Ying and **Yuhua Zhu**. 2021. A Note on Optimization Formulations of Markov Decision Processes. *Commun. Math. Sci., 20(3):727–745*

Jing An, Lexing Ying and **Yuhua Zhu***. 2021. Why Resampling Outperforms Reweighting for Correcting Sampling Bias with Stochastic Gradients. *ICLR.*

Yuhua Zhu and Lexing Ying. 2020. A Sharp Convergence Rate for a Model Equation of the Asynchronous Stochastic Gradient Descent. *Commun. Math. Sci. 19(3), 851-863.*

Yuhua Zhu and Lexing Ying. 2020. Borrowing From the Future: An Attempt to Address Double Sampling. *Mathematical and Scientific Machine Learning, PMLR 107:246-268.*

Xiaowu Dai and **Yuhua Zhu***. 2020. On Large Batch Training and Sharp Minima: A Fokker–Planck Perspective. *J. Stat. Theory Pract. 14(53).*

Jose Carrillo, Shi Jin, Lei Li and **Yuhua Zhu***. 2020. A Consensus-Based Global Optimization Method for High Dimensional Machine Learning Problems. *ESAIM: Control, Optimisation and Calculus of Variations 27, S5.*

Yuhua Zhu. 2019. A Local Sensitivity and Regularity Analysis for the Vlasov-Poisson-Fokker-Planck System with Multi-dimensional Uncertainty and the Spectral Convergence of the Stochastic Galerkin Method. *Netw. Heterog. Media. 14(4), 677-707.*

Pierre Degond, Shi Jin and **Yuhua Zhu***. 2019. An Uncertainty Quantification Approach to the Study of Gene Expression Robustness. *Methods Appl. Anal. (A special issue in honor of the 80th birthday of Prof. Ling Hsiao)*

Shi Jin and **Yuhua Zhu***. 2018. Hypocoercivity and Uniform Regularity for the Vlasov-Poisson-Fokker-Planck System with Uncertainty and Multiple Scales. *SIAM J. Math. Anal. 50, 1790-1816.*

Yuhua Zhu and Shi Jin. 2017. The Vlasov-Poisson-Fokker-Planck System with Uncertainty and a One-Dimensional Asymptotic-Preserving Method. *SIAM Multiscale Model. Simul., 15, 1502-1529.*

*: Alphabetical authorship

SUBMITTED

Jose A. Carrillo, Nicolas Garcia Trillos, Sixu Li, **Yuhua Zhu***. 2023. FedCBO: Reaching Group Consensus in Clustered Federated Learning through Consensus-based Optimization. *Submitted to Journal of Machine Learning Research.*

Yuhua Zhu, Lexing Ying and Zachary Izzo. 2022. Continuous-in-time Limit for Bayesian Bandits. *Under Minor Revision at Journal of Machine Learning Research.*

Michael Herty, Shi Jin and **Yuhua Zhu***. Stabilization of the Vlasov Fokker Planck Equation with Reflective Boundary Condition. *Under Minor Revision at Math. Control Relat. F.*

*: Alphabetical authorship

HONORS AND AWARDS

John A. Nohel prize, (An award to the best applied mathematics thesis at UW-Madison), 2018

SIAM Travel Award, SIAM Conference on Uncertainty Quantification, 2018

Student Research Travel Grants, University of Wisconsin - Madison, 2017

Elizabeth S. Hirschfelder Scholarship, (An award to outstanding female mathematics Ph.D. students), 2016

Scholarships at Shanghai Jiao Tong University

- Best Undergraduate Thesis Award, 2014
- Outstanding Graduate of Shanghai Jiao Tong University, 2014
- Academic Excellence Scholarship Class-A, 2012 & 2013

VISITING EXPERIENCE

Pierre Degond, Chair Professor in Applied Mathematics at Imperial College London, Nov-Dec, 2018, London, UK

Micheal Herty, Professor of Department of Mathematics Center for Computational Engineering Science (CCES), June, 2018, Aachen, Germany

Enrique Zuazua, the Director of the Chair of Computational Mathematics at DeustoTech Laboratory in the University of Deusto, June, 2018, Bilbao, Spain

Pierre Degond, Chair Professor in Applied Mathematics at Imperial College London, May, 2018, London, UK

Enrique Zuazua, the Director of the Chair of Computational Mathematics at DeustoTech Laboratory in the University of Deusto, Oct-Dec, 2017, Bilbao, Spain

GRANT

Development of machine learning technology for matching under a variety of realistic and large-scale preference structures. Jun. 2021–Nov. 2021

- National Science Foundation IIP Award #2133869.
- Total Amount: $50,000. PI: Lexin Li.
- Role: Technology Lead (similar to Co-PI).

Foundations of Reinforcement Learning and Its Applications to Decision Making. Submitted on 12/2022.

- National Science Foundation, Computer and Information Science and Engineering (CISE).
- Total Amount: $1,200,000.
- Role: PI. This project is in collaboration with PI HaizhaoYang at University of Maryland and PI Fei Miao at University of Connecticut.

Sequential Decision Making — A PDE Perspective. Submitted on 11/2022.

- National Science Foundation, Division of Mathematical Sciences (DMS).
- Total Amount: $400,000.
- Role: PI

ADVISING

Undergraduate Students

- Eric Song, HDSI, UCSD
- Hien Bui, HDSI, UCSD
- Vivek Saravanan, HDSI, UCSD
- Xiqiang Liu, HDSI, UCSD
- Jack Yang, Math, UCSD
- Zexing Yang, Math, UCSD
- Xiaoyue Wang, Math, UCSD
- Cody Li, Math, UCSD

TEACHING

University of California - San Diego, La Jolla, CA 2022 – present

- DSC 291: Partial Differential Equation and Machine Learning, Spring 2023
- MATH 173B: Optimization Methods for Data Science II, Winter 2023
- DSC 180: Data Science Project, Fall 2022
  Supervise four undergraduate students to complete a data science project.

Stanford University, Stanford, CA 2019 – 2021

- Tutorial on Reinforcement Learning, Fall 2020
- Tutorial on Multiscale Modeling, Spring 2021

University of Wisconsin-Madison, Madison, WI

Teaching Assistant 2015–2018

Graded, held weekly office hours, and taught weekly recitation sections.

- Math 211: Calculus, Spring 2018
- Math 234: Calculus and Analytic Geometry III, Spring 2017
- Math 222: Calculus and Analytic Geometry II, Fall 2016
- Math 222: Calculus and Analytic Geometry II, Spring 2016
- Math 222: Calculus and Analytic Geometry II, Fall 2015

TALKS & PRESENTATIONS

Seminar Presentations at Universities

- MIDO seminar, Rensselaer Polytechnic Institute, 02/2022
- Optimization Seminar, University of California San Diego, 11/2022
- CCoM Seminar, University of California San Diego, 11/2022
- PDE and Applied Math Seminar, University of California Riverside, 10/2022
- Math Colloquium, Harvard University, 2/2022
- Math Colloquium, Purdue University, 2/2022
- Math Colloquium, University of California, San Diego, 2/2022
- Math Colloquium, Carnegie Mellon University, 2/2022
- Math Colloquium, University of Toronto, 1/2022
- Math Colloquium, Washington University in St. Louis, 1/2022
- Math Colloquium, Emory University, 1/2022
- Math Colloquium, Florida State University, 1/2022
- Math Colloquium, University of North Carolina Chapel Hill, 1/2022
- Math Colloquium, University of California, Davis, 1/2022
- Math Colloquium, University of Illinois Urbana-Champaign, 1/2022
- Math Colloquium, University of Illinois Chicago, 1/2022
- Math Colloquium, University of California, Los Angeles, 12/2022
- Math Colloquium, National University of Singapore, 12/2021
- Math Colloquium, University of Maryland, College Park, 12/2021
- Math Colloquium, Chinese University of Hong Kong, Shenzhen, 12/2021
- Winter Young Mathematician Forum, Shanghai Jiao Tong University, China, 12/2021
- Math Colloquium, Peking University, 12/2021
- Math Colloquium, Chinese Academy of Sciences, 11/2021
- Applied and Computational Mathematics Seminar, University of Wisconsin-Madison, 10/2021
- Applied and Computational Math Seminar, University of Minnesota, 10/2021
- CCAM Seminar, Purdue University, 10/2020
- Applied Math Seminar, Stanford University, 01/2020
- ASA Student Chapter, University of Wisconsin-Madison, 11/2018

Presentations at Conferences

- SIAM Conference on Optimization, Seattle, WA, 05/2023
- Purpose-driven particle systems, Leiden, Netherlands, 03/2023
- SIAM Conference on Data Science, San Diego, CA, 09/2022
- VII Partial Differential Equations, Optimal Design and Numerics, Benasque, Spain, 08/2022
- GMOS Working Group: Consensus Based Optimization, Simons Institute at University of California Berkeley, 09/2021
- Mathematical and Scientific Machine Learning conference, via Zoom, 08/2021
- Mathematical and Scientific Machine Learning Conference, via Zoom, 07/2020
- The 2nd Annual Meeting of the SIAM Texas Louisiana Section, Dallas, TX, 11/2019

  Young Researchers Workshop: Ki-Net 2012-2019, College Park, MD, 10/2019
- Young Researcher Workshop on Uncertainty Quantification and Machine Learning, Shanghai, China, 06/2019
- Multiscale Computations for Kinetic and Related Problems, Raleigh, NC, 11/2018

- UQ for Kinetic Equations, SIAM Conference on Uncertainty Quantification, Garden Grove, CA, 04/2018
- Young Researchers Workshop: Current Trends in Kinetic Theory, College Park, MD, 10/2017
- Hypocoercivity and Sensitivity Analysis in Kinetic Equations and Uncertainty Quantification, Madison, WI, 10/2017
- International Conferenceon Uncertainty Quantificationin Computational Fluid Dynamics, Shanghai, China, 07/2017
- VII Partial Differential Equations, Optimal Design and Numerics, Benasque, Spain, 08/2017
- Summer School on Applied and Stochastic Analysis for Partial Differential Equations, Shanghai, China, 07/2017
- Boundary Value Problems and Multi-scale Coupling Methods for Kinetic Equations, Madison, WI, 04/2016
- Multi-scale Coupling Methods for Hypersonic Vehicle, Beijing, China, 06/2016
- XVI International Conference on Hyperbolic Problems, Aachen, Cermany, 08/2016