Yuhua Zhu

CONTACT INFORMATION

Department of Mathematics
Stanford University
450 Jane Stanford Way
Stanford, CA 94305, USA

Phone: +1-608-556-8385
E-mail: yuhuazhu@stanford.edu
Website: https://www.yuhuazhu.org

EMPLOYMENT

Stanford University, Stanford, CA

Postdoc Scholar, Mathematics, Aug. 2019 – Aug. 2022 (expected)

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

Intersection of Machine Learning and PDE; Reinforcement Learning; Optimization;
Numerical and Uncertain Aspects of Kinetic and Hyperbolic equations;
High Dimensional and Multiscale Computations for Physical and Biological problems;

PUBLISHED

Lexing Ying, **Yuhua Zhu**. 2020. A Note on Optimization Formulations of Markov Decision Processes. *Commun. Math. Sci., to appear*

Shi Jin, **Yuhua Zhu*** and Enrique Zuazua. 2019. The Vlasov Fokker Planck Equation with High Dimensional Parametric Forcing Term. *Numer. Math., to appear*

Yuhua Zhu, Lexing Ying and Zachary Izzo. 2021. Borrowing From the Future: Addressing Double Sampling in Model-free Control. *Mathematical and Scientific Machine Learning, PMLR, to appear*

Jing An, Lexing Ying, **Yuhua Zhu***. 2021. Why resampling outperforms reweighting for correcting sampling bias with stochastic gradients. *ICLR, 2021.*

Yuhua Zhu, 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, 2020.*

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

Yuhua Zhu, Lexing Ying. 2021. Variational Actor-Critic Algorithms. *Submitted to ESAIM: COCV.*

Michael Herty, Shi Jin and **Yuhua Zhu***. 2020. Stabilization of the Vlasov Fokker Planck Equation with Reflective Boundary Condition. *Submitted to 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).

TALKS & PRESENTATIONS

— Fokker-Planck equations and machine learning.

Invited talk, Applied math seminar, October, 2021, Madison, WI

Invited talk, Applied and Computational Math Seminar of University of Minnesota, October, 2021, via Zoom

— A consensus-based global optimization method for high dimensional machine learning problems.

Invited talk, GMOS Working Group: Consensus Based Optimization, September, 2021, Berkeley, CA

Invited talk, The 2nd Annual Meeting of the SIAM Texas Louisiana Section, November, 2019, Dallas, TX

Invited talk, Young Researchers Workshop: Ki-Net 2012-2019, October, 2019, College Park, MD

— Borrowing From the Future: Addressing Double Sampling in Model-free Control

Invited talk, Mathematical and Scientific Machine Learning conference, August, 2021, via Zoom

— Borrowing From the Future: An Attempt to Address Double Sampling

Invited talk, CCAM Seminar at Purdue University, Oct, 2020, via Zoom

Invited talk, Mathematical and Scientific Machine Learning Conference, Jul, 2020, via Zoom

Invited talk, Applied Math Seminar, Jan, 2020, Stanford, CA

— A PDE Perspective of Stochastic Gradient Descent in Deep Learning

Invited talk, Young Researcher Workshop on Uncertainty Quantification and Machine Learning, Jun, 2019, Shanghai, China

Invited talk, ASA Student Chapter, Nov, 2018, Madison, WI

— The Vlasov Fokker Planck Equation with High Dimensional Parametric Forcing Term

Invited talk, Multiscale Computations for Kinetic and Related Problems, Nov, 2018, Raleigh, NC

Minisymposium invited talk, UQ for Kinetic Equations, SIAM Conference on Uncertainty Quantification, Apr, 2018, Garden Grove, CA

— A Sensitivity Analysis on Vlasov-Poison-Fokker-Planck System with Uncertainty

Invited talk, Young Researchers Workshop: Current Trends in Kinetic Theory, Oct, 2017, College Park, MD

Invited talk, Hypocoercivity and Sensitivity Analysis in Kinetic Equations and Uncertainty Quantification, Oct, 2017, Madison, WI

Invited talk, International Conferenceon Uncertainty Quantificationin Computational Fluid Dynamics, Jul, 2017, Shanghai, China

— A Sensitivity Analysis on Boltzmann Equation with Uncertainty

Invited talk, VII Partial Differential Equations, Optimal Design and Numerics, Aug, 2017, Benasque, Spain

Invited talk, Summer School on Applied and Stochastic Analysis for Partial Differential Equations, Jul, 2017, Shanghai, China

— An Asymptotic-Preserving Method for the Vlasov-Poisson-Fokker-Planck System with Uncertainty

Invited talk, Boundary Value Problems and Multi-scale Coupling Methods for Kinetic Equations, Apr, 2016, Madison, WI

Invited talk, Multi-scale Coupling Methods for Hypersonic Vehicle, Jun, 2016, Beijing, China

Contribution talk, XVI International Conference on Hyperbolic Problems, Aug, 2016, Aachen, Cermany

TEACHING

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