Yufei Zhang

CONTACT INFORMATION

Office: COL B.100D, Columbia House
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RESEARCH INTERESTS

My research interests lie at the intersection of stochastic control and games, foundation of machine learning, and mathematical finance.

EMPLOYMENT

Assistant Professor, London School of Economics Department of Statistics — Sep. 2021-present

EDUCATION

University of Oxford, United Kingdom

D.Phil., Mathematics — Oct. 2017-June 2021

- Adviser: Professor Christoph Reisinger

The Chinese University of Hong Kong, Hong Kong

M.Phil., Mathematics — Aug. 2015-July 2017

M.Sc., Mathematics — Aug. 2013-June 2015

B.B.A., Insurance, Financial and Actuarial Analysis — Aug. 2008-June 2013

- Minor in Mathematics

REFEREED JOURNAL PUBLICATIONS

[1] Xin Guo, Anran Hu and Yufei Zhang, *Reinforcement learning for linear-convex models with jumps via stability analysis of feedback controls*, SIAM Journal on Control and Optimization, forthcoming, 2022 [Preprint version.]

[2] Matteo Basei, Xin Guo, Anran Hu and Yufei Zhang, *Logarithmic regret for episodic continuous-time linear-quadratic reinforcement learning over a finite-time horizon*, Journal of Machine Learning Research, 23 (2022), pp. 1–34. [Journal version.] [Preprint version.]

[3] Christoph Reisinger and Yufei Zhang, *Regularity and stability of feedback relaxed controls*, SIAM Journal on Control and Optimization, 59 (2021), pp. 3118–3151. [Journal version.] [Preprint version.]

[4] Kazufumi Ito, Christoph Reisinger, and Yufei Zhang, *A neural network based policy iteration algorithm with global H^2-superlinear convergence for stochastic games on domains*, Foundations of Computational Mathematics, 21 (2021), pp. 331–374. [Journal version.] [Preprint version.]

[5] Christoph Reisinger and Yufei Zhang, *A penalty scheme and policy iteration for nonlocal HJB variational inequalities with monotone drivers*, Computers and Mathematics with Applications, 93 (2021), pp. 199-213. [Journal version.] [Preprint version.]

[6] Christoph Reisinger and Yufei Zhang, *Rectified deep neural networks overcome the curse of dimensionality for nonsmooth value functions in zero-sum games of nonlinear stiff systems*, Analysis and Applications, 18 (2020), pp. 951-999. [Preprint version.]

[7] Christoph Reisinger and Yufei Zhang, *Error estimates of penalty schemes for quasi-variational inequalities arising from impulse control problems*, SIAM Journal on Control and Optimization, 58 (2020), pp. 243–276. [Journal version.] [Preprint version.]

[8] Christoph Reisinger and Yufei Zhang, *A penalty scheme for monotone systems with interconnected obstacles: convergence and error estimates*, SIAM Journal of Numerical Analysis, 57 (2019), pp. 1625–1648. [Journal version.] [Preprint version.]

[9] Roxana Dumitrescu, Christoph Reisinger, and Yufei Zhang, *Approximation schemes for mixed optimal stopping and control problems with nonlinear expectations and jumps*, Applied Mathematics & Optimization, Published online, July 2019. [Journal version.]

Refereed Conference publications

[1] Xinshi Chen, Yufei Zhang, Christoph Reisinger, and Le Song, *Understanding deep architectures with reasoning layer*, Advances in Neural Information Processing Systems (NeurIPS 2020), 33 (2020), pp. 1240–1252. [Journal version.] [Preprint version.]

Preprints and working papers

[1] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Optimal scheduling of entropy regulariser for continuous-time linear-quadratic reinforcement learning*, Submitted, arXiv:2208.04466, 2022.

[2] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Linear convergence of a policy gradient method for finite horizon continuous time stochastic control problems*, Submitted, arXiv:2203.11758, 2022.

[3] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Exploration-exploitation trade-off for continuous-time episodic reinforcement learning with linear-convex models*, Submitted, arXiv:2112.10264, 2021.

[4] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A fast iterative PDE-based algorithm for feedback controls of nonsmooth mean-field control problems*, Submitted, arXiv:2108.06740, 2021.

[5] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Path regularity of coupled McKean-Vlasov FBSDEs*, preprint, arXiv:2011.06664, 2020.

[6] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Optimal regularity of extended mean field controls and their piecewise constant approximation*, Submitted, arXiv:2009.08175v2, 2020.

[7] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A posteriori error estimates for fully coupled McKean-Vlasov forward-backward SDEs*, Submitted, arXiv:2007.07731, 2020.

Awards

- The Mathematical Institute DPhil Thesis Prize 2021, *University of Oxford*.
- G-Research PhD Prize in Maths and Data Science, *G-Research*, 2020.
- Academic Support Grands, *The Queen's College, University of Oxford*, 2017.
- Departmental Studentship, *Mathematical Institute, University of Oxford*, 2017–2021.
- Postgraduate Studentship, *The Chinese University of Hong Kong*, 2015–2017.
- Honours at Entrance, *The Chinese University of Hong Kong*, 2008–2013.

Invited talks

[1] *The 9th International Colloquium on BSDEs and Mean Field Systems*, Annecy, France, June 26–July 1, 2022.

[2] *Machine Learning and Mean-Field Games Workshop*, The Institute for Mathematical and Statistical Innovation, Chicago, May 23–27, 2022.

[3] *2nd Fudan-Warwick Workshop on Financial Mathematics and Stochastic Analysis*, University of Warwick, United Kingdom, July 30–31, 2019.

[4] *3rd International Conference on Computational Finance*, A Coruña, Spain, July 8–12, 2019.

[5] *International Workshop on PDE-Constrained Optimization, Optimal Controls and Applications*, Sanya, China, Dec. 10–14, 2018.

[6] *10th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis*, Oxford, United Kingdom, Nov. 29–Dec. 1, 2018.

[7] *14th Viennese Conference on Optimal Control and Dynamic Games*, Vienna, Austria, July 3–6, 2018.

OTHER TALKS

[1] *Maxwell Institute Probability Seminar*, Heriot-Watt University and University of Edinburgh, Virtual, Mar. 24, 2022.

[2] *Finance and Stochastic Seminar*, Imperial College London, Mar. 23, 2022.

[3] *Financial/Actuarial Mathematics Seminar*, University of Michigan, Virtual, Mar. 16, 2022.

[4] *SIAG/FME virtual seminar*, Virtual, Mar. 10, 2022.

[5] *15th German Probability and Statistics Days*, Virtual, Sept. 27-Oct. 1, 2021.

[6] *8th Workshop on High-Dimensional Approximation*, ETH Zurich, Switzerland, Sept. 9–13, 2019.

[7] *12th European Summer School in Financial Mathematics*, Padova, Italy, Sept. 2–6, 2019.

[8] *SIAM Financial Mathematics and Engineering (FM19)*, Toronto, Ontario, Canada, June 4–7, 2019.

[9] *Scientific Computation using Machine-Learning Algorithms*, Nottingham, United Kingdom, Apr. 25–26, 2019.

[10] *Oxford–ETH Workshop in Mathematical & Computational Finance*, Oxford, United Kingdom, Mar. 14–15, 2019.

[11] *Robust Techniques in Quantitative Finance*, Oxford, United Kingdom, Sept. 3–7, 2018.

[12] *11th European Summer School in Financial Mathematics*, Paris, France, Aug. 27–31, 2018.

[13] *The Fourth Young Researchers Meeting on BSDEs, Nonlinear Expectations and Mathematical Finance*, Shanghai, China, Apr. 23–27, 2018.

PROFESSIONAL SERVICE

Referee Service

- *Automatica*
- *Advances in Computational Mathematics*
- *Applied Mathematical Finance*
- *Applied Mathematics and Optimization*
- *Finance and Stochastics*
- *Journal of Computational Finance*
- *Journal of Mathematical Analysis and Applications*
- *Journal of Optimization Theory and Applications*
- *Market Microstructure and Liquidity*
- *SIAM Journal on Control and Optimization*
- *SIAM Journal on Financial Mathematics*
- *SIAM Journal on Scientific Computing*

Committee Service

- Treasurer, University of Oxford SIAM Student Chapter, 2018-20.
- Mathematrix, University of Oxford, 2020-21.

Teaching Experience

London School of Economics, United Kingdom

- Lecturer
  - Stochastic Process — Fall 2021
  - Computational Methods in Finance and Insurance — Spring 2022

University of Oxford, United Kingdom

- Tutor
  - Analysis II — Spring 2021
  - Fixed Income — Spring 2021
  - Financial Derivatives — Fall 2020
  - Introduction to Probability — Fall 2020
  - Advanced Numerical Methods — Spring 2020
  - Numerical Methods — Fall 2019
- Teaching Assistant
  - Analysis I — Fall 2020
  - Calibration — Spring 2019
  - Continuous Optimization — Spring 2019
  - Numerical Methods: Finite Differences — Fall 2018, Spring 2018, Spring 2019
  - Numerical Methods: Monte Carlo — Spring 2018

The Chinese University of Hong Kong, Hong Kong

- Teaching Assistant
  - Mathematical Analysis II — Spring 2016, Spring 2017
  - Numerical Methods for Differential Equations — Spring 2016
  - Mathematical Analysis I — Fall 2015, Fall 2016

Professional Memberships

- Institute of Mathematics and its Applications, Associate Member
- Society for Industrial and Applied Mathematics, Member