

Yufei Zhang

CONTACT INFORMATION

Office: 803, Weeks Building, South Kensington Campus
Mail: Department of Mathematics, 180 Queen's Gate,
South Kensington Campus, Imperial College London,
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RESEARCH INTERESTS

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

ACADEMIC APPOINTMENTS

Imperial College London, United Kingdom

Senior Lecturer at [Department of Mathematics](#)

Sep. 2023-present

London School of Economics, United Kingdom

Assistant Professor at [Department of Statistics](#)

Sep. 2021-Aug. 2023

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] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Linear convergence of a policy gradient method for some finite horizon continuous time control problems*, SIAM Journal on Control and Optimization, forthcoming, 2023 [Preprint version.]
- [2] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Optimal scheduling of entropy regulariser for continuous-time linear-quadratic reinforcement learning*, SIAM Journal on Control and Optimization, forthcoming, 2023 [Preprint version.]
- [3] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A posteriori error estimates for fully coupled McKean-Vlasov forward-backward SDEs*, IMA Journal of Numerical Analysis, online first, 2023 [Preprint version.]
- [4] 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, 61 (2023), pp. 755-787. [Preprint version.]
- [5] 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. [Preprint version.]
- [6] Christoph Reisinger and Yufei Zhang, *Regularity and stability of feedback relaxed controls*, SIAM Journal on Control and Optimization, 59 (2021), pp. 3118–3151. [Preprint version.]

- [7] 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. [Preprint version.]
- [8] 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. [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, 83 (2021), pp. 1387–1429.
- [10] 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.]
- [11] 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. [Preprint version.]
- [12] 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. [Preprint 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. [Preprint version.]

PREPRINTS

- [1] Bekzhan Kerimkulov, James-Michael Leahy, David Siska, Lukasz Szpruch, and Yufei Zhang, *A Fisher-Rao gradient flow for entropy-regularised Markov decision processes in Polish spaces*, [arXiv:2310.02951](#), Submitted, 2023.
- [2] Xin Guo and Yufei Zhang, *Towards An Analytical Framework for Potential Games*, [arXiv:2310.0225](#), Submitted, 2023.
- [3] Eyal Neuman, Wolfgang Stockinger, and Yufei Zhang, *An offline learning approach to propagator models*, Submitted, [arXiv:2309.02994](#), 2023.
- [4] Tanut Treetanthiploet, Yufei Zhang, Lukasz Szpruch, Isaac Bowers-Barnard, Henrietta Riddle, James Hickey, and Chris Pearce, *Insurance pricing on price comparison websites via reinforcement learning*, Submitted, [arXiv:2308.06935](#), 2023.
- [5] Eyal Neuman and Yufei Zhang, *Statistical learning with sublinear regret of propagator models*, Submitted, [arXiv:2301.05157](#), 2023.
- [6] Michael Giegrich, Christoph Reisinger, and Yufei Zhang, *Convergence of policy gradient methods for finite-horizon stochastic linear-quadratic control problems*, Revision, SIAM Journal on Control and Optimization, [arXiv:2211.00617](#), 2022.
- [7] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Exploration-exploitation trade-off for continuous-time episodic reinforcement learning with linear-convex models*, Revision, The Annals of Applied Probability, [arXiv:2112.10264](#), 2021.
- [8] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A fast iterative PDE-based algorithm for feedback controls of nonsmooth mean-field control problems*, Revised and resubmitted, SIAM Journal on Scientific Computing, [arXiv:2108.06740](#), 2021.
- [9] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Path regularity of coupled McKean-Vlasov FBSDEs*, preprint, [arXiv:2011.06664](#), 2020.

- [10] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *Optimal regularity of extended mean field controls and their piecewise constant approximation*, preprint, [arXiv:2009.08175v2](https://arxiv.org/abs/2009.08175v2), 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.

GRANTS

- [1] Co-Investigator, “Reinforcement Learning for Insurance Pricing” in partnership with The Alan Turing Institute, £39,000, November 1, 2022 to April 28, 2023.

INVITED TALKS

- [1] *7th London-Paris Bachelier Workshop on Mathematical Finance*, London, Sept. 18-19, 2023.
- [2] *The Second HKSIAM Biennial Meeting*, Hong Kong, Aug. 28-Sept. 1, 2023.
- [3] *Recent Advances on Quantitative Finance*, Hong Kong, Aug. 27-30, 2023
- [4] *10th International Congress on Industrial and Applied Mathematics*, Tokyo, Aug. 20-25, 2023.
- [5] *11th Advanced Mathematical Methods for Finance Conference*, Bielefeld, June 26-30, 2023.
- [6] *Stochastic Analysis and Math Finance Seminar*, Berlin, June 22, 2023.
- [7] *Berlin Probability colloquium*, Berlin, June 21, 2023.
- [8] *North British Probability Seminar*, The University of Edinburgh, June 14, 2023.
- [9] *Data Science Seminar*, The University of Essex, May 11, 2023.
- [10] *2nd Workshop on Machine Learning for PDEs*, Imperial College London, Apr. 3-4, 2023.
- [11] *Probability Seminar*, The University of Bath, Jan. 9, 2023.
- [12] *World Online Seminars on Machine Learning in Finance*, Virtual, Nov. 22, 2022.
- [13] *Machine Learning and Optimal Control*, Royal Statistical Society, Virtual, Oct. 19, 2022.
- [14] *Finance and Stochastic Seminar*, The University of Sydney, Oct. 11, 2022.
- [15] *London-Paris Bachelier Workshop on Mathematical Finance*, Paris, France, Sept. 15-16, 2022.
- [16] *Machine learning for PDEs*, London, UK, Sept. 6-8, 2022.
- [17] *The 9th International Colloquium on BSDEs and Mean Field Systems*, Annecy, France, June 26–July 1, 2022.
- [18] *Machine Learning and Mean-Field Games Workshop*, The Institute for Mathematical and Statistical Innovation, Chicago, May 23–27, 2022.
- [19] *Maxwell Institute Probability Seminar*, Heriot-Watt University and University of Edinburgh, Mar. 24, 2022.
- [20] *Finance and Stochastic Seminar*, Imperial College London, Mar. 23, 2022.

- [21] *Financial/Actuarial Mathematics Seminar*, University of Michigan, Virtual, Mar. 16, 2022.
- [22] *SIAG/FME virtual seminar*, Virtual, Mar. 10, 2022.
- [23] *15th German Probability and Statistics Days*, Virtual, Sept. 27-Oct. 1, 2021.
- [24] *2nd Fudan-Warwick Workshop on Financial Mathematics and Stochastic Analysis*, University of Warwick, UK, July 30–31, 2019.
- [25] *3rd International Conference on Computational Finance*, A Coruña, Spain, July 8–12, 2019.
- [26] *International Workshop on PDE-Constrained Optimization, Optimal Controls and Applications*, Sanya, China, Dec. 10–14, 2018.
- [27] *10th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis*, Oxford, United Kingdom, Nov. 29–Dec. 1, 2018.
- [28] *14th Viennese Conference on Optimal Control and Dynamic Games*, Vienna, Austria, July 3–6, 2018.

OTHER TALKS

- [1] *8th Workshop on High-Dimensional Approximation*, ETH Zurich, Switzerland, Sept. 9–13, 2019.
- [2] *12th European Summer School in Financial Mathematics*, Padova, Italy, Sept. 2–6, 2019.
- [3] *SIAM Financial Mathematics and Engineering (FM19)*, Toronto, Ontario, Canada, June 4–7, 2019.
- [4] *Scientific Computation using Machine-Learning Algorithms*, Nottingham, United Kingdom, Apr. 25–26, 2019.
- [5] *Oxford–ETH Workshop in Mathematical & Computational Finance*, Oxford, United Kingdom, Mar. 14–15, 2019.
- [6] *Robust Techniques in Quantitative Finance*, Oxford, United Kingdom, Sept. 3–7, 2018.
- [7] *11th European Summer School in Financial Mathematics*, Paris, France, Aug. 27–31, 2018.
- [8] *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*
- *Advances in Continuous and Discrete Models: Theory and Applications*
- *Applied Mathematical Finance*
- *Applied Mathematics and Optimization*
- *Discrete and Continuous Dynamical Systems Series B*
- *Finance and Stochastics*
- *Journal of Computational Finance*
- *Journal of Mathematical Analysis and Applications*
- *Journal of Machine Learning*
- *Journal of Optimization Theory and Applications*
- *Market Microstructure and Liquidity*
- *SIAM Journal on Control and Optimization*
- *SIAM Journal on Financial Mathematics*
- *SIAM Journal on Financial Mathematics*
- *Stochastic Processes and Their Applications*

- *Advances in Neural Information Processing Systems (NeurIPS 2021)*
- *Conference on Mathematical and Scientific Machine Learning (MSML 2020)*

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, 2022
 - Stochastic Simulation Spring 2023
 - Computational Methods in Finance and Insurance Spring 2022, 2023

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

Last updated on October 5, 2023