

## Yufei Zhang

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### CONTACT INFORMATION

**Office:** 803, Weeks Building, South Kensington Campus  
**Mail:** Department of Mathematics, 180 Queen's Gate,  
South Kensington Campus, Imperial College London,  
London, SW7 2AZ  
**E-mail:** [yufei.zhang@imperial.ac.uk](mailto:yufei.zhang@imperial.ac.uk)  
**Website:** <https://yufei-zhang.github.io>

### RESEARCH INTERESTS

Stochastic Control and Games, Mathematical and Computational Finance, Theory and Applications of Machine Learning, particularly Deep Learning and Reinforcement Learning.

### 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

**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

### JOURNAL PUBLICATIONS

- [1] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A fast iterative PDE-based algorithm for feedback controls of nonsmooth mean-field control problems*, SIAM Journal on Scientific Computing, 46 (2024), pp. A2737-A2773. [Preprint version.]
- [2] Lukasz Szpruch, Tanut Treetanthiploet, and Yufei Zhang, *Exploration-exploitation trade-off for continuous-time episodic reinforcement learning with linear-convex models*, The Annals of Applied Probability, forthcoming. [Preprint version.]
- [3] Michael Giegrich, Christoph Reisinger, and Yufei Zhang, *Convergence of policy gradient methods for finite-horizon exploratory linear-quadratic control problems*, SIAM Journal on Control and Optimization, 62 (2024), pp. 1060-1092. [Preprint version.]
- [4] 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, 62 (2024), pp. 135-166. [Preprint version.]
- [5] 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, 61 (2023), pp. 3526-3558. [Preprint version.]
- [6] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, *A posteriori error estimates for fully coupled McKean-Vlasov forward-backward SDEs*, IMA Journal of Numerical Analysis, 44 (2024), pp. 2323-2369. [Preprint version.]

- [7] 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.]
- [8] 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.]
- [9] 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.]
- [10] 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.]
- [11] 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.]
- [12] 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.
- [13] 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.]
- [14] 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.]
- [15] 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.]

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] Lukasz Szpruch, Marc Sabaté Vidales, Tanut Treetanthiploet, Yufei Zhang, *Pricing and hedging of decentralised lending contracts*, Submitted, arXiv:2409.04233, 2024.
- [2] Christoph Knochenhauer, Alexander Merkel, and Yufei Zhang, *Continuous-time dynamic decision making with costly information*, Submitted, arXiv:2408.09693, 2024.
- [3] Deven Sethi, David Šiška, and Yufei Zhang, *Entropy annealing for policy mirror descent in continuous time and space*, Submitted, arXiv:2405.20250, 2024.
- [4] Tanut Treetanthiploet, Łukasz Szpruch, and Yufei Zhang,  *$\epsilon$ -policy gradient for online pricing*, Submitted, arXiv:2405.03624, 2024.
- [5] Xin Guo, Xinyu Li, and Yufei Zhang, *An  $\alpha$ -potential game framework for  $N$ -player games*, arXiv:2403.16962, 2024.
- [6] Bekzhan Kerimkulov, David Šiška, Łukasz Szpruch, and Yufei Zhang, *Mirror descent for stochastic control problems with measure-valued controls*, Submitted, arXiv:2401.01198, 2024.

	<p>[7] Bekzhan Kerimkulov, James-Michael Leahy, David Šiška, Łukasz Szpruch, and Yufei Zhang, <i>A Fisher-Rao gradient flow for entropy-regularised Markov decision processes in Polish spaces</i>, Revision at Foundations of Computational Mathematics, <a href="#">arXiv:2310.02951</a>, 2023.</p> <p>[8] Xin Guo and Yufei Zhang, <i>Towards an analytical framework for dynamic potential games</i>, Revision at SIAM Journal on Control and Optimization, <a href="#">arXiv:2310.0225</a>, 2023.</p> <p>[9] Eyal Neuman, Wolfgang Stockinger, and Yufei Zhang, <i>An offline learning approach to propagator models</i>, Submitted, <a href="#">arXiv:2309.02994</a>, 2023.</p> <p>[10] Eyal Neuman and Yufei Zhang, <i>Statistical learning with sublinear regret of propagator models</i>, Revision at The Annals of Applied Probability, <a href="#">arXiv:2301.05157</a>, 2023.</p> <p>[11] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, <i>Optimal regularity of extended mean field controls and their piecewise constant approximation</i>, preprint, <a href="#">arXiv:2009.08175v2</a>, 2020.</p>
TECHNICAL REPORTS	<p>[1] Tanut Treetanthiploet, Yufei Zhang, Łukasz Szpruch, Isaac Bowers-Barnard, Henrietta Ridley, James Hickey, and Chris Pearce, <i>Insurance pricing on price comparison websites via reinforcement learning</i>, <a href="#">arXiv:2308.06935</a>, 2023.</p> <p>[2] Christoph Reisinger, Wolfgang Stockinger, and Yufei Zhang, <i>Path regularity of coupled McKean-Vlasov FBSDEs</i>, <a href="#">arXiv:2011.06664</a>, 2020.</p>
AWARDS	<ul style="list-style-type: none"> <li>• The Mathematical Institute DPhil Thesis Prize 2021, <i>University of Oxford</i>.</li> <li>• G-Research PhD Prize in Maths and Data Science, <i>G-Research</i>, 2020.</li> <li>• Academic Support Grant, <i>The Queen's College, University of Oxford</i>, 2017.</li> <li>• Departmental Studentship, <i>Mathematical Institute, University of Oxford</i>, 2017–2021.</li> </ul>
GRANTS	<ul style="list-style-type: none"> <li>• CNRS-Imperial “Abraham de Moivre” International Lab in Mathematics Short-Term Exchange Grant, £1,400, 2024.</li> <li>• Co-Investigator, “Reinforcement Learning for Insurance Pricing” in partnership with The Alan Turing Institute, £39,000, November 1, 2022 to April 28, 2023.</li> </ul>
PH.D SUPERVISION	<ul style="list-style-type: none"> <li>• Philipp Plank (2024-now, Imperial College London).</li> </ul>
WORKSHOPS & SEMINARS ORGANISATION	<ul style="list-style-type: none"> <li>• Co-organizer of the workshop “Bridging Stochastic Control and Reinforcement Learning” at the Isaac Newton Institute Satellite Program <ul style="list-style-type: none"> <li>– Proposal got funded £119,840 by the Isaac Newton Institute to host a one-month program at the Alan Turing Institute in 2025.</li> </ul> </li> <li>• Co-organizer of the workshop “Advances in Stochastic Control and Reinforcement Learning: Theory and Application” at the Banff International Research Station, Canada (April 27-May 2, 2025) <ul style="list-style-type: none"> <li>– Proposal got funded by Banff to support a one-week workshop with 42 in-person participants and 200 online participants.</li> </ul> </li> <li>• Co-organizer of the London Mathematical Finance Seminar series (September 2021-now) <ul style="list-style-type: none"> <li>– Bi-weekly seminars involving academics from multiple London institutions and industry practitioners.</li> </ul> </li> <li>• Co-organizer of the Algorithmic Learning in Games Seminar (September 2024-now) <ul style="list-style-type: none"> <li>– Bi-weekly seminars involving applied mathematicians, computer scientists and economists.</li> </ul> </li> <li>• Co-organizer of 8th-London-Paris Bachelier Workshop, Paris (September 2024).</li> <li>• Co-organizer of ETH–Hong Kong–Imperial Mathematical Finance Workshop, London (June 2024).</li> <li>• Co-organizer of 7th-London-Paris Bachelier Workshop, London (September 2023).</li> </ul>

## REVIEWER

- Journals (in alphabetical order)
  - in **mathematical finance**: Applied Mathematical Finance, Finance and Stochastics, Journal of Computational Finance, Market Microstructure and Liquidity, Mathematical Finance, SIAM Journal on Financial Mathematics, and others.
  - in **control and optimization**: Applied Mathematics and Optimization, Automatica, IEEE Transactions on Automatic Control, Operations Research, SIAM Journal on Control and Optimization, and others.
  - in **machine learning**: Journal of Machine Learning Research, Journal of Machine Learning, and others.
  - in **probability and statistics**: Annals of Applied Probability, Annals of Statistics, Stochastic Processes and Their Applications, and others.
  - in **computational mathematics**: Advances in Computational Mathematics, SIAM Journal on Scientific Computing, and others.
  - in **other areas of applied mathematics**: Discrete and Continuous Dynamical Systems Series B, Journal of Mathematical Analysis and Applications, and others.
- Conferences
  - in **machine learning**: Advances in Neural Information Processing Systems (NeurIPS 2021), Conference on Mathematical and Scientific Machine Learning (MSML 2020).

## INVITED TALKS

- *12th Bachelier World Congress of the Bachelier Finance Society*, Rio de Janeiro, July 8-12, 2024.
- *New Trends and Challenges in Stochastic Differential Games*, Banff, June 23-28, 2024.
- *ETH-Hong Kong-Imperial Mathematical Finance Workshop*, London, June 17-20, 2024.
- *Probability for Machine Learning seminar*, Oxford, June 12, 2024.
- *Mathematical Finance seminar*, Bielefeld, June 5, 2024.
- *Bachelier Seminar*, Paris, April 17, 2024.
- *Fields-CFI Bootcamp on Machine Learning in Quantitative Finance*, Toronto, April 25-26, 2024.
- *Recent Advances in Stochastic Control, Machine Learning and Quantitative Finance*, Shanghai, April 15-19, 2024.
- *IMSI Workshop on Decision Making and Uncertainty*, Chicago, Feb. 2-9, 2024.
- *CityU-NUS MFG/MFC seminar*, Jan. 30, 2024.
- *16th International Conference of the ERCIM WG on Computational and Methodological Statistics*, Berlin, Dec. 16-18, 2023.
- *7th London-Paris Bachelier Workshop on Mathematical Finance*, London, Sept. 18-19, 2023.
- *The Second HKSIAM Biennial Meeting*, Hong Kong, Aug. 28-Sept. 1, 2023.
- *Recent Advances on Quantitative Finance*, Hong Kong, Aug. 27-30, 2023.
- *10th International Congress on Industrial and Applied Mathematics*, Tokyo, Aug. 20-25, 2023.
- *11th Advanced Mathematical Methods for Finance Conference*, Bielefeld, June 26-30, 2023.
- *Stochastic Analysis and Math Finance Seminar*, Berlin, June 22, 2023.
- *Berlin Probability Colloquium*, Berlin, June 21, 2023.
- *North British Probability Seminar*, The University of Edinburgh, June 14, 2023.
- *Data Science Seminar*, The University of Essex, May 11, 2023.
- *2nd Workshop on Machine Learning for PDEs*, Imperial College London, Apr. 3-4, 2023.
- *Probability Seminar*, The University of Bath, Jan. 9, 2023.
- *World Online Seminars on Machine Learning in Finance*, Virtual, Nov. 22, 2022.
- *Machine Learning and Optimal Control*, Royal Statistical Society, Virtual, Oct. 19, 2022.
- *Finance and Stochastic Seminar*, The University of Sydney, Oct. 11, 2022.
- *London-Paris Bachelier Workshop on Mathematical Finance*, Paris, France, Sept. 15-16, 2022.

- *Machine Learning for PDEs*, London, UK, Sept. 6-8, 2022.
- *The 9th International Colloquium on BSDEs and Mean Field Systems*, Annecy, France, June 26–July 1, 2022.
- *IMSI Workshop on Machine Learning and Mean-Field Games*, Chicago, May 23–27, 2022.
- *Maxwell Institute Probability Seminar*, Heriot-Watt University and University of Edinburgh, Mar. 24, 2022.
- *Finance and Stochastic Seminar*, Imperial College London, Mar. 23, 2022.
- *Financial/Actuarial Mathematics Seminar*, University of Michigan, Virtual, Mar. 16, 2022.
- *SIAG/FME virtual seminar*, Virtual, Mar. 10, 2022.
- *15th German Probability and Statistics Days*, Virtual, Sept. 27-Oct. 1, 2021.
- *2nd Fudan-Warwick Workshop on Financial Mathematics and Stochastic Analysis*, University of Warwick, UK, July 30–31, 2019.
- *3rd International Conference on Computational Finance*, A Coruña, Spain, July 8–12, 2019.
- *International Workshop on PDE-Constrained Optimization, Optimal Controls and Applications*, Sanya, China, Dec. 10–14, 2018.
- *10th Oxford-Berlin Young Researchers Meeting on Applied Stochastic Analysis*, Oxford, United Kingdom, Nov. 29–Dec. 1, 2018.
- *14th Viennese Conference on Optimal Control and Dynamic Games*, Vienna, Austria, July 3–6, 2018.

#### TEACHING EXPERIENCE

- Lecturer at Imperial College London:
  - Simulation Methods for Finance Spring 2024, 2025
  - Advances in Machine Learning Spring 2025
  - Interest Rate Models Spring 2025
- Lecturer at London School of Economics:
  - Stochastic Process Fall 2021, 2022
  - Stochastic Simulation Spring 2023
  - Computational Methods in Finance and Insurance Spring 2022, 2023
- Tutor at University of Oxford:
  - 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

#### PROFESSIONAL MEMBERSHIPS

- Member, Bachelier Finance Society
- Member, Society for Industrial and Applied Mathematics

*Last updated on October 14, 2024*