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Department of Data Science
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Biography

Dr Xiang Zhou received his BSc from Peking University and PhD from Princeton University. Before joining the Department of Mathematics at City University in 2012, he worked as a research associate at Princeton University and Brown University. He is jointly appointed in the School of Data Science and the Department of Mathematics since 2018. His major research interests include noise-induced transitions and stochastic systems, the study of rare events and its applications in physics, chemistry, biology, engineering and finance. His recent works include the transition state calculations, the interface between the machine learning algorithms, stochastic systems, optimal control and rare events.

Employment

Department of Data Science
City University of Hong Kong
9 Aug 2018 → 1 Sept 2024

Department of Mathematics
City University of Hong Kong
9 Aug 2018 → 1 Sept 2024

Department of Mathematics
City University of Hong Kong
1 Jul 2018 → 18 Aug 2018

Department of Mathematics
City University of Hong Kong
27 Apr 2012 → 1 Jul 2018

Department of Mathematics
City University of Hong Kong
1 Sept 2024 → 2 Jan 2025

Department of Data Science
City University of Hong Kong
1 Sept 2024 → 2 Jan 2025

Department of Mathematics
City University of Hong Kong
2 Jan 2025 → present

Department of Data Science
City University of Hong Kong
2 Jan 2025 → present

Research outputs

Critical points, stability, and basins of attraction of three Kuramoto oscillators with isosceles triangle network

ZHAO, X. & ZHOU, X., Dec 2024, In: Applied Mathematics Letters. 158, 6 p., 109246.

Approximation of functionals on Korobov spaces with Fourier Functional Networks

Liu, P., Liu, Y., Zhou, X. & Zhou, D.-X., Feb 2025, In: Neural Networks. 182, 106922.

一種基於機器學習的金融衍生品對沖方法

XIAO, B. (Inventor), ZHOU, X. (Inventor) & PENG, X. (Inventor), 18 Feb 2024, (Accepted/In press/Filed) Priority No. 202410179678.4

Roughness Index for Loss Landscapes of Neural Network Models of Partial Differential Equations

Wu, K., Jian, X., Du, R., Chen, J. & ZHOU, X., Dec 2023, *Proceedings - 2023 IEEE International Conference on Big Data*. He, J., Palpanas, T., Hu, X., Cuzzocrea, A. & Dou, D. (eds.). Institute of Electrical and Electronics Engineers, Inc., p. 966-975 (Proceedings - IEEE International Conference on Big Data, BigData).

Exploring the Optimal Choice for Generative Processes in Diffusion Models: Ordinary vs Stochastic Differential Equations

Cao, Y., Chen, J., Luo, Y. & Zhou, X., 2023, *37th Conference on Neural Information Processing Systems (NeurIPS 2023)*. Oh, A., Naumann, T., Globerson, A., Saenko, K., Hardt, M. & Levine, S. (eds.). p. 33420-33468 (Advances in Neural Information Processing Systems; vol. 36).Scopus citations: 1

Value-gradient based formulation of optimal control problem and machine learning algorithm

BENSOUSSAN, A., HAN, J., YAM, S. C. P. & ZHOU, X., 2023, In: SIAM Journal on Numerical Analysis. 61, 2, p. 973-994 22 p.Scopus citations: 3

Active Learning for Saddle Point Calculation

Gu, S., Wang, H. & Zhou, X., Dec 2022, In: Journal of Scientific Computing. 93, 3, 78.Scopus citations: 3

Residual-Quantile Adjustment for Adaptive Training of Physics-informed Neural Network

Han, J., Cai, Z., Wu, Z. & Zhou, X., Dec 2022, *Proceedings - 2022 IEEE International Conference on Big Data*. Tsumoto, S., Ohsawa, Y., Van den Poel, D., Hu, X., Motomura, Y., Takagi, T., Wu, L., Xie, Y., Abe, A. & Raghavan, V. (eds.). Institute of Electrical and Electronics Engineers, Inc., p. 921-930 (Proceedings - IEEE International Conference on Big Data, Big Data).Scopus citations: 5

Learn Quasi-Stationary Distributions of Finite State Markov Chain

Cai, Z., Lin, L. & Zhou, X., Jan 2022, In: Entropy. 24, 1, 133.Scopus citations: 1

Fine-grained Attention and Feature-sharing Generative Adversarial Networks for Single Image Super-Resolution

Yan, Y., Liu, C., Chen, C., Sun, X., Jin, L., Peng, X. & Zhou, X., 2022, In: IEEE Transactions on Multimedia. 24, p. 1473-1487Scopus citations: 49

Machine learning and control theory

Bensoussan, A., Li, Y., Nguyen, D. P. C., Tran, M.-B., Yam, S. C. P. & Zhou, X., 2022, *Handbook of Numerical Analysis*. Trélat, E. & Zuazua, E. (eds.). Elsevier B.V., Vol. 23. p. 531-558 Scopus citations: 9

Optimal Option Hedging with Policy Gradient

Xiao, B., Yao, W. & Zhou, X., Dec 2021, *Proceedings - 21st IEEE International Conference on Data Mining Workshops, ICDMW 2021*. Xue, B., Pechenizkiy, M. & Koh, Y. S. (eds.). IEEE Computer Society, p. 1112-1119 (IEEE International Conference on Data Mining Workshops, ICDMW; vol. 2021-December).Scopus citations: 1

Projection Method for Saddle Points of Energy Functional in H^1 Metric

Gu, S., Lin, L. & Zhou, X., Oct 2021, In: Journal of Scientific Computing. 89, 1, 12.Scopus citations: 1

Explicit estimation of derivatives from data and differential equations by gaussian process regression

Wang, H. & Zhou, X., 2021, In: International Journal for Uncertainty Quantification. 11, 4, p. 41-57Scopus citations: 7

A fast screening framework for second-life batteries based on an improved bisecting K-means algorithm combined with fast pulse test

Zhou, Z., Ran, A., Chen, S., Zhang, X., Wei, G., Li, B. & Kang, F. & 2 others, Zhou, X. & Sun, H., Oct 2020, In: Journal of Energy Storage. 31, 8 p., 101739.Scopus citations: 57

Stochastic dynamics of an active particle escaping from a potential well

Gu, S., Qian, T., Zhang, H. & Zhou, X., May 2020, In: Chaos. 30, 5, 053133.Scopus citations: 7

A gradient screening approach for retired lithium-ion batteries based on X-ray computed tomography images

Ran, A., Chen, S., Zhang, S., Liu, S., Zhou, Z., Nie, P. & Qian, K. & 8 others, Fang, L., Zhao, S.-X., Li, B., Kang, F., Zhou, X., Sun, H., Zhang, X. & Wei, G., 2020, In: RSC Advances. 10, 32, p. 19117-19123Scopus citations: 18

Asymptotic analysis for elliptic equations with small perturbations on domains in high-contrast medium

Chen, J., Lin, L., Zhang, Z. & Zhou, X., 2020, In: Asymptotic Analysis. 119, 3-4, p. 153-198 46 p.

On the Global Convergence of Continuous-Time Stochastic Heavy-Ball Method for Nonconvex Optimization

Hu, W., Li, C. J. & Zhou, X., Dec 2019, *Proceedings - 2019 IEEE International Conference on Big Data*. Baru, C., Huan, J. & Khan, L. (eds.). Institute of Electrical and Electronics Engineers, Inc., p. 94-104 9005621. (Proceedings - IEEE International Conference on Big Data, Big Data).

Quasi-Potential Calculation and Minimum Action Method for Limit Cycle

Lin, L., Yu, H. & Zhou, X., 15 Jun 2019, In: Journal of Nonlinear Science. 29, 3, p. 961-991Scopus citations: 8

Estimation of exciton diffusion lengths of organic semiconductors in random domains

Chen, J., Lin, L., Zhang, Z. & Zhou, X., 1 Jan 2019, In: Journal of Computational Physics. 376, p. 894-912Scopus citations : 3

Simplified gentlest ascent dynamics for saddle points in non-gradient systems

Gu, S. & Zhou, X., Dec 2018, In: Chaos. 28, 12, 123106.Scopus citations: 8

MODERATE DEVIATION FOR RANDOM ELLIPTIC PDE WITH SMALL NOISE

Li, X., Liu, J., Lu, J. & Zhou, X., Oct 2018, In: Annals of Applied Probability. 28, 5, p. 2781-2813Scopus citations: 2

Asymptotic Expansion with Boundary Layer Analysis for Strongly Anisotropic Elliptic Equations

LIN, L. & ZHOU, X., Sept 2018, In: Communications in Mathematical Sciences. 16, 3, p. 635-658

An Improved Adaptive Minimum Action Method for the Calculation of Transition Path in Non-Gradient Systems

Sun, Y. & Zhou, X., Jul 2018, In: Communications in Computational Physics. 24, 1, p. 44-68Scopus citations: 5

Convex splitting method for the calculation of transition states of energy functional

Gu, S. & Zhou, X., 15 Jan 2018, In: Journal of Computational Physics. 353, p. 417-434Scopus citations: 9

Asymptotically Efficient Simulation of Elliptic Problems with Small Random Forcing

WAN, X. & ZHOU, X., 2018, In: SIAM Journal of Scientific Computing. 40, 1, p. A548-A572

Multiscale Gentlest Ascent Dynamics for Saddle Point in Effective Dynamics of Slow-Fast System

GU, S. & ZHOU, X., 2017, In: Communications in Mathematical Sciences. 15, 8, p. 2279-2302Scopus citations: 5

Sensitivity analysis and optimization of reaction rate

Gu, S., Lin, L. & Zhou, X., 2017, In: Communications in Mathematical Sciences. 15, 6, p. 1507-1525Scopus citations: 1

Explore Stochastic Instabilities of Periodic Points by Transition Path Theory

Cao, Y., Lin, L. & Zhou, X., Jun 2016, In: Journal of Nonlinear Science. 26, 3, p. 755-786Scopus citations: 1

Iterative minimization algorithm for efficient calculations of transition states

Gao, W., Leng, J. & Zhou, X., 15 Mar 2016, In: Journal of Computational Physics. 309, p. 69-87Scopus citations: 22

Finding Transition Pathways on Manifolds

LI, T., LI, X. & ZHOU, X., 2016, In: Multiscale Modeling & Simulation. 14, 1, p. 173-206Scopus citations: 8

Escaping from an attractor: Importance sampling and rest points i

Dupuis, P., Spiliopoulos, K. & Zhou, X., Oct 2015, In: Annals of Applied Probability. 25, 5, p. 2909-2958Scopus citations: 25

A cross-entropy scheme for mixtures

Wang, H. & Zhou, X., Jan 2015, In: ACM Transactions on Modeling and Computer Simulation. 25, 1, 6.Scopus citations: 6

An iterative minimization formulation for saddle point search

Gao, W., Leng, J. & Zhou, X., 2015, In: SIAM Journal on Numerical Analysis. 53, 4, p. 1786-1805Scopus citations: 30

Efficient rare event simulation for failure problems in random media

LIU, J., LU, J. & ZHOU, X., 2015, In: SIAM Journal on Scientific Computing. 37, 2, p. A609-A624Scopus citations: 7

Extreme analysis of a random ordinary differential equation

LIU, J. & ZHOU, X., Dec 2014, In: Journal of Applied Probability. 51, 4, p. 1021-1036Scopus citations: 2

On the failure probability of one dimensional random material under delta external force

Liu, J. & Zhou, X., 2013, In: Communications in Mathematical Sciences. 11, 2, p. 499-521Scopus citations: 2

Subcritical bifurcation in spatially extended systems

Weinan, E., Zhou, X. & Cheng, X., Mar 2012, In: Nonlinearity. 25, 3, p. 761-779Scopus citations: 9

The gentlest ascent dynamics

Weinan, E. & Zhou, X., Jun 2011, In: Nonlinearity. 24, 6, p. 1831-1842Scopus citations: 94

Failure of random materials: A large deviation and computational study

Liu, J., Zhou, X., Patra, R. & Weinan, E., 2011, *Proceedings - Winter Simulation Conference*. p. 3779-3789 6148070
Scopus citations: 3

STUDY OF NOISE-INDUCED TRANSITIONS IN THE LORENZ SYSTEM USING THE MINIMUM ACTION METHOD

ZHOU, X. & E, W., Jun 2010, In: Communications in Mathematical Sciences. 8, 2, p. 341-355Scopus citations: 33

Study of the noise-induced transition and the exploration of the phase space for the Kuramoto-Sivashinsky equation using the minimum action method

Wan, X., Zhou, X. & E, W., 2010, In: Nonlinearity. 23, 3, p. 475-493Scopus citations: 22

Time-varying perturbations can distinguish among integrate-to-threshold models for perceptual decision making in reaction time tasks.

Zhou, X., Wong-Lin, K. & Philip, H., Aug 2009, In: Neural Computation. 21, 8, p. 2336-2362Scopus citations: 15

Adaptive minimum action method for the study of rare events

Zhou, X., Ren, W. & Weinan, E., 2008, In: Journal of Chemical Physics. 128, 10, 104111.Scopus citations: 82

ANALYSIS OF 1+1 DIMENSIONAL STOCHASTIC MODELS OF LIQUIDS CRYSTAL POLYMER FLOWS
LI, T., Zhang, P. & ZHOU, X., Jun 2004, In: Communications in Mathematical Sciences. 2, 2, p. 295-316Scopus citations:
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Grants