Yuanchao Xu

Nationality: China

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Room 4-405, Maskawa Building for Education and Research, Kyoto

Working Experience

Kyoto University
Postdoc, Applied Mathematics
September 2025 - August 2030

Education Experience

University of Alberta
Doctor of Philosophy (*Dissertation Award*), Applied Mathematics
September 2021 - August 2025

University of Manitoba
Master of Science, Mathematics
September 2018 - August 2020

University of Oregon
Bachelor of Science (*Cum Laude*), Mathematics
January 2015 - December 2017

Research Interest

My research interest lies in data-driven methods for stochastic dynamical system. In particular, I am interested in building up theoretical framework for learning stochastic Koopman operator and applying it into complex real-world problems, e.g., neurodynamics, reinforcement learning and generative diffusion modeling, etc.

Research

1. Reinforced Data-Driven Estimation for Spectral Properties of Koopman Semigroup in Stochastic Dynamical Systems (in preparation, 2025)
2. Spectral analysis of Koopman operator through pseudo-resolvent (in preparation, 2025)
3. A Data-Driven Framework for Koopman Semigroup Estimation in Stochastic Dynamical Systems (accepted by Chaos, 2025)
4. Koopman Eigenfunctions Links Multiscale State-Dependent Brain Dynamics (in preparation, 2025)
5. ResKoopNet: Learning Koopman Representations for Complex Dynamics with Spectral Residuals (ICML2025 (poster), Vancouver, Canada, 2025)
6. Koopman Spectral Analysis Uncovers the Temporal Structure of Spontaneous Neural Events (COSYNE (poster), Lisbon, Portugal, 2024)
7. Decentralized Multi-Agent Reinforcement Learning for Task Offloading Under Uncertainty (arXiv, 2021)

Talk

1. *Perturbation method for learning stochastic Koopman operator*
   CREST
   RIKEN, Kobe, Japan, December 26-28th, 2024
2. *Extracting Dynamics from Complex Systems: Deterministic and Stochastic Perspectives*
   East China University of Science and Technology, Shanghai, China, December 19th, 2024
3. *Data-driven dynamical system with Koopman operator*
   Alberta Graduate Mathematics and Statistics Conference(AGMSC)
   University of Alberta, Edmonton, Canada July 3-5th, 2024

Visiting

1. Ehime University, Matsuyama, Japan, December 23-25th, 2024

Awards

- Faculty of Science Doctoral Dissertation Award, 2025
- Mary Louise Imrie Graduate Student Award, 2025
- Dr. Josephine M. Mitchell Recruitment Scholarship, 2021
- International Graduate Student Entrance Scholarship, 2020
- International Graduate Student Entrance Scholarship, 2018
- Clarence and Lucille Dunbar Scholarship, 2017

Teaching Experience

Math 102(lab) Applied Linear Algebra	*Winter 2025*
Math 209(lab) Calculus for Engineering 3	*Fall 2024*
Math 209(lab) Calculus for Engineering 3	*Spring 2024*
Math 102(lab) Applied Linear Algebra	*Winter 2024*
Math 201(lab) Differential Equations	*Fall 2023*
Math 101(lab) Calculus for Engineering 2	*Spring 2023*
Math 201(lab) Differential Equations	*Winter 2023*
Graduate Research Assistant	*September 2020 - August 2021*
Graduate Teaching Assistant	*September 2018 - August 2020*
Undergraduate Teaching Assistant	*September 2016 - December 2017*
Undergraduate Math Tutor	*April 2016 - December 2017*