

Yao Li

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Research Interests

Stochastic Dynamical Systems, Stochastic Processes, Stochastic differential equations

- Applications to mathematical physics and mathematical biology
- Numerical Analysis, Stochastic simulations

Employment

Assistant Professor, Department of Mathematics and Statistics, University of Massachusetts Amherst, 2015 – present

Courant Instructor, Courant Institute of Mathematical Sciences, New York University, 2012 – 2015

Teaching Assistant, School of Mathematics, Georgia Institute of Technology, 2007–2012

Research Assistant, School of Mathematics, Georgia Institute of Technology, 2009 summer and 2012 summer

Academic Visiting

Research member, Mathematical Sciences Research Institute, 2015 fall

Education

Ph.D in Mathematics, Georgia Institute of Technology, 2012

Advisor: **Yingfei Yi**

B.S. in Mathematics, Shanghai Jiao Tong University, China, 2007.

Grants

UMass Amherst HEG Faculty Research Grant, \$ 12,426, 2017-2018

MSP Research Support Grant, \$ 1,000, 2017

Simons Collaboration Grant, \$ 42,000, 2018-2018 (terminated after having NSF grant)

NSF DMS-1813246, \$144,192, 2018-2021

Publications and Preprints

1. Thermal conductivity and local thermodynamic equilibrium of stochastic energy exchange models, (with Wenbo Xie) *Under Review*, *arXiv: 1808.07953*
2. Firing rate and spatial correlation in a stochastic neural field model, (with Hui Xu) *Under Review*, *arXiv: 1805.07246*
3. A data-driven method for the steady state of randomly perturbed dynamics, *Under Review* (arXiv: 1805.04099)
4. From billiards to thermodynamic laws: stochastic energy exchange model, (with Lingchen Bu) *Chaos: An Interdisciplinary Journal of Nonlinear Science*, *accepted* (arXiv: 1805.02133)
5. How well do reduced models capture the dynamics in models of interacting neurons? (with Logan Chariker and Lai-Sang Young), *Journal of Mathematical Biology*, *accepted* (arXiv: 1711.01487)
6. On the polynomial convergence rate to nonequilibrium steady state, *The Annals of Applied Probability*, *accepted* (arXiv: 1607.08492)
7. Numerical simulation of polynomial-speed convergence phenomenon (with Hui Xu), *Journal of Statistical Physics* 169(4), 697-729, 2017
8. Polynomial convergence to equilibrium for a system of interacting particles (with Lai-Sang Young), *The Annals of Applied Probability* 27(1), 65-90, 2017
9. Systematic measures of biological networks, part I: Invariant measures and entropy (with Yingfei Yi), *Communications on Pure and Applied Mathematics*, Vol. LXIX, 1777-1811, 2016
10. Systematic measures of biological networks, part II: Degeneracy, complexity and robustness. (with Yingfei Yi), *Communications on Pure and Applied Mathematics*, Vol. LXIX, 19521983, 2016
11. Local thermodynamic equilibrium for some multidimensional stochastic models (with Peter Nandori and Lai-Sang Young), *Journal of Statistical Physics* 163(1), 2016, 61-91
12. Convergence to global equilibrium for Fokker-Planck equations on a graph and talagrand-type inequalities (with Rui Che, Wen Huang and Prasad Tetali), *Journal of Differential Equations* 261, 2552-2583, 2016
13. A fast exact simulation algorithm for a class of Markov jump processes (with Lili Hu), *The Journal of Chemical Physics*, 143(18), 2015
14. On the stochastic modification of locally confined particle systems, *Chaos: An Interdisciplinary Journal of Nonlinear Science* 25, 073121, 2015
15. A limiting strategy for the back and forth error compensation and correction method for solving advection equations (with Lili Hu, Yingjie Liu), *Mathematics of Computation* 85, 2016, 1263 - 1280
16. Nonequilibrium steady states for a class of particle systems (with Lai-Sang Young), *Nonlinearity* 27(3), 607, 2014
17. Existence of nonequilibrium steady state for a simple model of heat conduction (with Lai-Sang Young), *Journal of Statistical Physics*, pp. 1170-1193, 2013
18. Quantifying degeneracy, complexity and robustness in biological systems (with Gaurav Dwivedi, Wen Huang, Melissa L. Kemp and Yingfei Yi), *Journal of Theoretical Biology*, 302:2938, 2012

19. Fokker-Planck equation for a free energy functional or markov process on a graph (with Shui-Nee Chow, Wen Huang, Hao-min Zhou), *Archive for Rational Mechanics and Analysis, Volume 205, pp. 969-1008, 2011*
20. A free energy based mathematical study for molecular motors (with Shui-Nee Chow, Wen Huang, Hao-min Zhou), *Regular and Chaotic Dynamics, Volume 16, Issue 1-2, pp. 117-127, 2010*

Selected Presentations

PIMS-AMI Seminar, University of Alberta, Canada, August 24th, 2018

The International Congress of Mathematical Physics, Montreal, Canada, July 27th, 2018

Dynamics seminar, Tufts University, MA, April 20th, 2018

Dynamical Systems seminar, University of Toronto, Canada, January 17th, 2018

PIMS Workshop on Nonlinear Stochastic Dynamics, University of Alberta, Canada, August 14th, 2017

Applied Math Seminar, University of Le Havre, France, June 22nd, 2017

2016 CMS Winter Meeting, December 4th, 2016

International Conference on Statistical Properties of Nonequilibrium Dynamical Systems, Shenzhen, China, August 1st, 2016

The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, July 4th and 5th, 2016

Probability Seminar, Brown University, March 15, 2016

Interplay of Stochastic and Deterministic Dynamics in Networks, The Mathematical Biosciences Institute, February 23, 2016

SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 19th, 2015

Math Physics Seminar, Georgia Tech, Nov. 6th, 2014

The 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Madrid, Spain, Jul. 10th, 2014

111th Statistical Mechanics Conference, Rutgers University, May 13th, 2014

Dynamics Days, Georgia Tech, Jan. 5th, 2014

First International Conference on Dynamics of Differential Equations, Georgia Tech, Mar. 20, 2013

Workshop on Functional Inequalities and Discrete Spaces, Université Paris-Est Marne-la-Vallée, Jan. 14 2011

PDE seminar, Georgia Tech, Apr.13 2010

Supervisions

Dr. Jiayu Zhai, Visiting assistant professor (under joint supervision with Matthew Dobson)

Mr. Lingchen Bu, current PhD student.

Ms. Wenjie Li - Research Experiences for Undergraduates, *Information-theoretical measures of neural field models*, Summer 2018

Ms. Hui Xu - Honor Thesis, August 2017 to May 2018

Mr. Jimmy Hwang and Mr. Wenbo Xie - Research Experiences for Undergraduates, *Nonequilibrium steady state for an energy exchange model*, Summer 2017

Ms. Hui Xu and Mr. Jake Reiser - Research Experiences for Undergraduates, *The computation of speed of mixing for Markov jump processes*, Summer 2016

Ms. Huangyi Shi - Research Experiences for Undergraduates, *Finite time Monte Carlo method for invariant measures* May 2015 to October 2015

Mr. Haipeng Gao - Master's thesis: *A numerical investigation of some stochastic thermal conduction models*, Graduated in 2015

Mr. Ye Wang - Master's thesis: *A comparison of GARCH and stochastic volatility option pricing models*, Graduated in 2015

Teaching

2018 Fall: Ordinary Differential Equations (for graduates), Statistics I

2018 Spring: Intro to Scientific Computing, Statistics I

2017 Fall: Numerical Analysis I

2017 Spring: Probability Theory

2016 Fall: Ordinary Differential Equations

2016 Spring: Statistics I (two sections)

2015 Spring: Ordinary Differential Equations

2014 Fall: Analysis I

2014 Spring: Linear Algebra

2013 Fall: Calculus I

2013 Spring: Linear Algebra

2012 Fall: Discrete Mathematics

2011 Summer: Classical Mathematical Methods in Engineering

2010 Summer: Linear Algebra

Recitation Class TA : Calculus I-III, Differential Equations (2008 – 2012)

Programming Skills

Proficient in C/C++, Matlab, Mathematica; Familiar with Python, SAS, R

Proficient in high performance computing (MPI, OpenMP, CUDA .etc)

Last updated: June 2018

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