Bin Shi

Zhongguancun East Road
Beijing 100190, China
+81-(010)82541583
shibin@lsec.cc.ac.cn

Academic Appointments

05/2021–present **Associate Professor**.
State Key Laboratory of Scientific and Engineering Computing
Academy of Mathematics and Systems Science
Chines Academy of Sciences

01/2019–05/2021 **Postdoctoral Scholar (Hosted by Michael I. Jordan)**.
Department of Electrical Engineering & Computer Science
University of California, Berkeley

Education

2015–2018 **Ph.D in Computer Science**.
Major: Theoretical Machine Learning
School of Computing and Information Sciences, Florida International University, FL

2013–2015 **M.S. in Physics**.
Major: Theoretical Physics
Department of Physics, University of Massachusetts, Dartmouth, MA

2008–2011 **M.S. in Mathematics**.
Major: Pure Mathematics
Thesis: Nekhoroshev Estimates for Infinite-Dimensional Reversible System with Chain Structure,
Advisor: Xiaoping Yuan
School of Mathematical Science, Fudan University, Shanghai, China

2002–2006 **B.S. in Mathematics**.
Major: Pure and Applied Mathematics
School of Mathematical Science, Ocean University of China, Qingdao, China

Research Interests

- First-order optimization
- Reinforcement learning, stochastic control and differential game
- Geometrical analysis in fluid dynamics
- Stochastic dynamics under quasi-periodic potential
- Mathematical theory of turbulence and geostrophic turbulence
- Nonlinear Landau damping and KAM theory
- Quantum Hall Effect
- Many-Body Localization: Stability and Chaos

Publications

- **Conjugate and Cut Points in Ideal Fluid Motion**.
  Theodore D. Drivas, Gerard Misiołek, **Bin Shi** and Tsuyoshi Yoneda
  To appear in Annales Mathématiques du Québec, special volume in honor of Professor Shnirelman's 75th birthday

- **Understanding the Acceleration Phenomenon via High-Resolution Differential Equations**.
  Bin Shi, Simon S. Du, Michael I. Jordan, and Weijie J. Su
  Mathematical Programming, Series A, 2021

- **Acceleration via Symplectic Discretization of High-Resolution Differential Equations**.
  Bin Shi, Simon S. Du, Weijie J. Su and Michael I. Jordan
  Thirty-third Conference on Neural Information Processing Systems, 2019

- **A Conservation Law Method in Optimization**.
  Bin Shi, Tao Li and Sundaraja S. Iyengar
  The Tenth Workshop on Optimization for Machine Learning
  Thirty-first Conference on Neural Information Processing Systems, 2017

- **Mathematical Theories of Machine Learning - Theory and Applications**.
  Bin Shi and Sundaraja S. Iyengar
  Springer International Publishing, 2020

Preprents

- **On Learning Rates and Schrödinger Operators**.
  Bin Shi, Weijie J. Su and Michael I. Jordan
  arXiv preprint arXiv:2004.06977, under review of Journal of Machine Learning Research

- **On the Hyperparameters in SGD with Momentum**.
  Bin Shi
  https://arxiv.org/abs/2108.03947, submitted

In Preparation

- **Inverse Energy Transfer in the 2D Incompressible Euler Equations**.
  Theodore D. Drivas, Gerard Misiołek, **Bin Shi** and Tsuyoshi Yoneda

- **Spectral Theory for Fokker-Planck Equation with Quasi-Periodic Potential**.
  Bin Shi and Yunfeng Shi

- **Spectral Theory for Kinetic Fokker-Planck Equation with Quasi-Periodic Potential**.
  Bin Shi and Yunfeng Shi

Professional Experience

Journal Review **SIAM Journal on Optimization**, **Computational Optimization and Applications**, **Journal of Machine Learning Research**, **IEEE Access**

Conf. Review **NeurIPS**, **ICLR**

Work Experience

2015-2018 Teaching Assistant in Florida International University

- Computer Programming I (COP-2210)
- Computer Programming II (COP-3337)
- Introduction to Algorithms (COT-5407)
- Theory of Computation (COT-5310)

2013-2015 Research Assistant in University of Massachusetts, Dartmouth

2013 Temporary Research Staff in Institute of Oceanology, Chinese Academy of Sciences, China

2008-2011 Teaching Assistant in Fudan University

- Mathematical Analysis
- Riemannian Geometry
- Partial Differential Equations
- Mathematical Method of Classical Mechanics

References: Optimization and Machine Learning

Michael I. Jordan
Pehong Chen Distinguished Professor
Department of EECS
Department of Statistics
University of California
Berkeley, CA, 94720-1776
☎ +1(510)642-9575
✉ jordan@cs.berkeley.edu

Yurii Nesterov
Professor
Louvain School of Engineering
ICTEAM and LIDAM
Université catholique de Louvain
Louvain-la-Neuve, Belgium, 1348
☎ +32-10-47-43-48
✉ yurii.nesterov@uclouvain.be

References: Pure Mathematics

Xiaoping Yuan
Professor, Yangtze River Scholar
School of Mathematical Science
Fudan University
Shanghai, China, 200433
☎ +86(021)6564-8904
✉ xpyuan@fudan.edu.cn

Gerard Misołek
Professor
Department of Mathematics
University of Notre Dame
Notre Dame, IN 46556-4618
☎ +1-(574)631-4176
✉ gmisiole@nd.edu