Lei Li
Curriculum Vitae

Institute of Natural Sciences,
School of Mathematical Sciences,
Shanghai Jiao Tong University
Shanghai, China, 200240
✉ leili2010@sjtu.edu.cn
🖥 https://ins.sjtu.edu.cn/people/leili/

Research Interests

I am broadly interested in applied mathematics, including
- Scientific computing (random algorithms for interacting particle systems, machine learning etc; numerical SDEs and PDEs)
- Applied analysis (analysis of particle systems, time fractional equations, fluid-structure interaction)

Education

2010-2015	**Ph.D., Mathematics**, *University of Wisconsin-Madison*.
2013	**M.A., Mathematics**, *University of Wisconsin-Madison*.
2012	**M.S., Computer Science**, *University of Wisconsin-Madison*.
2006-2010	**B.S., Mahtematics and Physics**, *Tsinghua University, Beijing*.

Positions

2018-present	**Tenure-Track Associate Professor**, *Shanghai Jiao Tong University*.
2015-2018	**William W. Elliott Assistant Research Professor**, *Duke University*.

Preprints and publications

1 L. Li and D. Wang. Energy and quadratic invariants preserving methods for hamiltonian systems with holonomic constraints. *J. Comput. Math.*, accepted.

2 L. Li and D. Wang. Complete monotonicity-preserving numerical methods for time fractional ODEs. *Comm. Math. Sci.*, 19(5), 2021.

3 L. Li, J. Lu, J. Mattingly, and L. Wang. Numerical methods for stochastic differential equations based on Gaussian mixture. *Comm. Math. Sci.*, 19(6), 2021.

4 S. Jin, L. Li, Z. Xu, and Y. Zhao. A random batch Ewald method for particle systems with Coulomb interactions. *SIAM Journal on Scientific Computing*, 43(4):B937–B960, 2021.

5 S. Jin, L. Li, and J.-G. Liu. Convergence of the random batch method for interacting particles with disparate species and weights. *SIAM Journal on Numerical Analysis*, 59(2):746–768, 2021.

6 S. Jin and L. Li. On the mean field limit of the random batch method for interacting particle systems. *Science China Mathematics*, pages 1–34, 2021.

7   Y. Feng, G. Iyer, and L. Li. Scheduling fixed length quarantines to minimize the total number of fatalities during an epidemic. *Journal of Mathematical Biology*, 82(7):1–17, 2021.

8   J. A. Carrillo, S. Jin, L. Li, and Y. Zhu. A consensus-based global optimization method for high dimensional machine learning problems. *ESAIM: Control, Optimisation and Calculus of Variations*, 27:S5, 2021.

9   L. Li, Z. Xu, and Y. Zhao. A random-batch Monte Carlo method for many-body systems with singular kernels. *SIAM Journal on Scientific Computing*, 42(3):A1486–A1509, 2020.

10   L. Li and J.-G. Liu. Large time behaviors of upwind schemes and ??-schemes for Fokker-Planck equations on ? by jump processes. *Mathematics of Computation*, 89(325):2283–2320, 2020.

11   L. Li, Y. Li, J.-G. Liu, Z. Liu, and J. Lu. A stochastic version of Stein variational gradient descent for efficient sampling. *Communications in Applied Mathematics and Computational Science*, 15(1):37–63, 2020.

12   S. Jin, L. Li, and J.-G. Liu. Random batch methods (rbm) for interacting particle systems. *Journal of Computational Physics*, 400:108877, 2020.

13   Y. Feng, T. Gao, L. Li, J.-G. Liu, and Y. Lu. Uniform-in-time weak error analysis for stochastic gradient descent algorithms via diffusion approximation. *Comm. Math. Sci.*, 18(1), 2020.

14   D. Fang and L. Li. Numerical approximation and fast evaluation of the overdamped generalized Langevin equation with fractional noise. *ESAIM: Mathematical Modelling and Numerical Analysis*, 54(2):431–463, 2020.

15   L. Li, J.-G. Liu, and P. Yu. On the mean field limit for Brownian particles with Coulomb interaction in 3D. *J. Math. Phys.*, 60(11):111501, 2019.

16   L. Li and J.-G. Liu. A discretization of Caputo derivatives with application to time fractional SDEs and gradient flows. *SIAM Journal on Numerical Analysis*, 57(5):2095–2120, 2019.

17   W. Hu, C. J. Li, L. Li, and J.-G. Liu. On the diffusion approximation of nonconvex stochastic gradient descent. *Annals of Mathematical Sciences and Applications*, 4(1):3–32, 2019.

18   Y. Gao, L. Li, and J.-G. Liu. Patched peakon weak solutions of the modified Camassa–Holm equation. *Physica D: Nonlinear Phenomena*, 390:15–35, 2019.

19   L. Li, J.-G. Liu, and L. Wang. Cauchy problems for Keller–Segel type time–space fractional diffusion equation. *Journal of Differential Equations*, 265(3):1044–1096, 2018.

20   L. Li and J.-G. Liu. Some compactness criteria for weak solutions of time fractional PDEs. *SIAM Journal on Mathematical Analysis*, 50(4):3963–3995, 2018.

21   L. Li and J.-G. Liu. p-Euler equations and p-Navier–Stokes equations. *Journal of Differential Equations*, 264(7):4707–4748, 2018.

22 L. Li and J.-G. Liu. A note on deconvolution with completely monotone sequences and discrete fractional calculus. *Quarterly of Applied Mathematics*, 76(1), 2018.

23 L. Li and J.-G. Liu. A generalized definition of Caputo derivatives and its application to fractional ODEs. *SIAM Journal on Mathematical Analysis*, 50(3):2867–2900, 2018.

24 Y. Gao, L. Li, and J.-G. Liu. A dispersive regularization for the modified Camassa–Holm equation. *SIAM Journal on Mathematical Analysis*, 50(3):2807–2838, 2018.

25 Y. Feng, L. Li, J.-G. Liu, and X. Xu. A note on one-dimensional time fractional ODEs. *Applied Mathematics Letters*, 83:87–94, 2018.

26 Y. Feng, L. Li, J.-G. Liu, and X. Xu. Continuous and discrete one dimensional autonomous fractional ODEs. *Discrete Cont. Dyn. Syst.-B*, 23(8), 2018.

27 Y. Feng, L. Li, and J.-G. Liu. Semi-groups of stochastic gradient descent and online principal component analysis: properties and diffusion approximations. *Comm. Math. Sci.*, 16(3), 2018.

28 L. Li, X. Xu, and S. E. Spagnolie. A locally gradient-preserving reinitialization for level set functions. *Journal of Scientific Computing*, 71(1):274–302, 2017.

29 L. Li, J.-G. Liu, and J. Lu. Fractional stochastic differential equations satisfying fluctuation-dissipation theorem. *Journal of Statistical Physics*, 169(2):316–339, 2017.

30 L. Li and S. E. Spagnolie. Swimming and pumping by helical waves in viscous and viscoelastic fluids. *Physics of Fluids*, 27(2):021902, 2015.

31 H. Manikantan, L. Li, S. E. Spagnolie, and D. Saintillan. The instability of a sedimenting suspension of weakly flexible fibres. *Journal of fluid mechanics*, 756:935–964, 2014.

32 F. Liang, Y. Li, L. Li, and J. Wang. Analytical solution for laterally loaded long piles based on fourier–laplace integral. *Applied Mathematical Modelling*, 38(21-22):5198–5216, 2014.

33 L. Li and S. E. Spagnolie. Swimming and pumping of rigid helical bodies in viscous fluids. *Physics of Fluids*, 26(4):041901, 2014.

34 L. Li, H. Manikantan, D. Saintillan, and S. E. Spagnolie. The sedimentation of flexible filaments. *Journal of Fluid Mechanics*, 735:705–736, 2013.

Teaching experience

2018-present	Shanghai Jiao Tong U.: Instructor, Advanced Computational Methods
2015-2018	Duke University: Instructor, Numerical PDEs, Mathematical Fluid Dynamics, Multivariable Calculus
2010-2015	UW-Madison: Teaching Assistant, calculus, linear algebra and applied analysis etc

Awards and Honors

2020	**National Overseas High-Level Young Talents Program**, *China.*
2019	**Guo-Benyu excellent paper award for young scholars,** , *Shanghai, China.*
2014/2015	**John Nohel Prize in Applied Mathematics**, *University of WisconsinMadison.*

Services

- Ph.D. student advisor (at SJTU)
- One of the organizers of workshops
- Reviewers for many journals

Skills

Languages	Chinese mandarin, English
Computer languages	C/C++, java, Matlab, HTML, LaTeX

Selected talks

Oct. 2021	Scientific computation section, Annual meeting for Chinese mathematical society, Kunming, China
Nov. 2019	Plenary talk, Shanghai workshop on computational methods in science and engineering, Shanghai, China