Tian-Zhi Li

E-mail: tlee@stu.pku.edu.cn Homepage: tianzhi-li.github.io

Basic Information

I am a final-year PhD student at Peking University (PKU), working with Professors Zhisheng Duan and Jinzhi Wang. From Dec 2024 to Nov 2025, I was fortunate to work as a visiting PhD at Nanyang Technological University (NTU), Singapore, with Professor François Gay-Balmaz. Prior to that, I received my B.Sc. in Mathematics from Beijing Institute of Technology (BIT) in 2021 under the supervision of Prof. Donghua Shi.

My research interest lies in the field of **Geometric Modeling** and **Control** of mechanical systems. I am broadly interested in leveraging differential geometry and physical principles to develop computationally efficient algorithms for **control**, **estimation**, and **learning** with sound theoretical guarantees.

Education

Peking University Sep 2021 - Jul 2026
PhD Student (Dynamical Systems and Control)

Nanyang Technological University Dec 2024 - Nov 2025
Visiting PhD (Mechanics and Control)

Beijing Institute of Technology Sep 2017 - Jun 2021
Bachelor of Science (Mathematics)

Teaching Experience

Teaching Assistant, Peking University Sep 2023 - Dec 2023
Ordinary Differential Equations
- Recieved *Excellent Teaching Assistant Award* (second time)

Teaching Assistant, Peking University Sep 2022 - Dec 2022
Linear Algebra
- Recieved *Excellent Teaching Assistant Award*

Teaching Assistant, Peking University Mar 2022 - Jun 2022
Analytic Mechanics

Publications

[1] **T. Li** and J. Wang, Variational Unscented Kalman Filter on Matrix Lie Groups, **Automatica** (Regular Paper), 172: 111995, 2025. [Paper Link]

[2] **T. Li**, R. Fu, and J. Wang, Reduced Dynamics and Geometric Optimal Control of Nonequilibrium Thermodynamics: Gaussian Case, **Automatica** (Regular Paper), 164: 111626, 2024. [Paper Link]

[3] **T. Li** and J. Wang, Physics-Informed Gaussian Process Learning on Lie Groups, **Journal of Guidance, Control, and Dynamics**, 48 (11), pp. 2654-2662, 2025. [Paper Link]

[4] **T. Li**, J. Wang, and Z. Duan, Structure-Preserving Unscented Kalman Filter for Planar Mobile Robots, **IEEE Control Systems Letters**, vol. 9, pp. 2157-2162, 2025. [Paper Link]

[5] **T. Li**, F. Gay-Balmaz, D. Shi, and J. Wang, Variational Principle for Stochastic Nonholonomic Systems **Part II**: Stochastic Nonholonomic Integrator. In: Nielsen, F., Barbaresco, F. (eds) Geometric Science of Information (**GSI'25**), Saint-Malo, France, vol. 16034, pp. 225-233. Springer, 2026. [Paper Link]

[6] **T. Li**, F. Gay-Balmaz, D. Shi, and J. Wang, Variational Principle for Stochastic Nonholonomic Systems **Part I**: Continuous-Time Formulation. In: Nielsen, F., Barbaresco, F. (eds) Geometric

Science of Information (**GSI'25**), France, vol. 16034, pp. 204-213. Springer, 2026. [Paper Link]

[7] **T. Li** and J. Wang, A Structure-Preserving Learning Scheme on SO(3), 2024 43rd IEEE Chinese Control Conference (**CCC'24**), Kunming, China, 2024, pp. 5149-5152. [Paper Link]

[8] **T. Li** and J. Wang, Multisymplectic Unscented Kalman Filter for Geometrically Exact Beams. In: Nielsen, F., Barbaresco, F. (eds) International Conference on Geometric Science of Information (**GSI'23**). Lecture Notes in Computer Science, Saint-Malo, France, vol. 14072, pp. 60-68, Springer Verlag. [Paper Link]

[9] **T. Li** and J. Wang, A Physics-Informed Gaussian Process Regression Algorithm for The Dynamics of The Planar Pendulum, 2023 42nd IEEE Chinese Control Conference (**CCC'23**), Tianjin, China, pp. 5163-5167, 2023. [Paper Link]

[10] **T. Li** and J. Wang, A Statistical Dynamical Algorithm for Gaussian Multi-Agent Systems Under Hamel's Formalism, 34th IEEE Chinese Control and Decision Conference (**CCDC'22**), Hefei, China, pp. 1344-1349, 2022. [Paper Link]

Honors and Awards

- **National Scholarship** (top 1%) Sep-2025
  Issued by Ministry of Education
- **Presidential Doctoral Scholarship** Jun-2025
  Issued by Peking University
- **Merit Student Award** (top 1%) Sep-2025
  Issued by Peking University
- **Dean's Scholarship - First Prize** Oct-2024
  Issued by College of Engineering, Peking University
- **Yuehua Luo Scholarship** Nov-2024
  Issued by Peking University
- **Excellent Teaching Assistant Award** (two times) Mar-2024 / Apr-2023
  Issued by College of Engineering, Peking University

References

Professor Zhisheng Duan
Position: Professor of Dynamics and Control
Deputy Director of State Key Laboratory for Turbulence & Complex Systems
Affiliation: Peking University
E-mail: duanzs@pku.edu.cn

Professor François Gay-Balmaz
Position: Associate Professor of Mathematics
Affiliation: Nanyang Technological University
E-mail: francois.gb@ntu.edu.sg

Professor Jinzhi Wang
Position: Professor of Dynamics and Control
Affiliation: Peking University
E-mail: jinzhiw@pku.edu.cn

Professor Donghua Shi
Position: Associate Professor of Mathematics
Director of Beijing Key Laboratory on MCAACI
Affiliation: Beijing Institute of Technology
E-mail: dshi@bit.edu.cn