

Tian-Zhi Li

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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 Professor [Donghua Shi](#).

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

Education

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| Peking University PhD Student (Dynamical Systems and Control) | Sep 2021 - Jul 2026 |
| Nanyang Technological University, Singapore Visiting PhD (Mechanics and Control) | Dec 2024 - Nov 2025 |
| Beijing Institute of Technology Bachelor of Science (Mathematics) | Sep 2017 - Jun 2021 |

Teaching Experience

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| Teaching Assistant , Peking University Ordinary Differential Equations - Recieved <i>Excellent Teaching Assistant Award</i> (second time) | Sep 2023 - Dec 2023 |
| Teaching Assistant , Peking University Linear Algebra - Recieved <i>Excellent Teaching Assistant Award</i> | Sep 2022 - Dec 2022 |
| Teaching Assistant , Peking University Analytic Mechanics | Mar 2022 - Jun 2022 |

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

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

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

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Professor Donghua Shi

Position: Associate Professor of Mathematics

Director of Beijing Key Laboratory on MCAACI

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