

Taiyang Xu

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Current position	Fudan University , Shanghai, China Department of Mathematics Postdoctoral Fellow (Mentor: Prof. Lun Zhang)	07/2024 – now
Education	Fudan University , Shanghai, China Ph.D. in Mathematics, supervisor Prof. Engui Fan Thesis title: “ <i>On the long-time asymptotics of the local and nonlocal mKdV equation under the nonzero background</i> ” China University of Mining and Technology , Xuzhou, China B.Sc. in Mathematics, Distinguished Honor Thesis title “ <i>Inverse scattering theory and integrability on several kinds of nonlinear evolution equations</i> ”	09/2019 – 06/2024 09/2015 – 06/2019
Research interests	Integrable PDEs, Random matrices theory, Determinantal point processes, Orthogonal polynomials, Asymptotic analysis, Riemann-Hilbert (RH) problems, Special functions, Painlevé equations.	
Research articles	Preprints <ol style="list-style-type: none">Confluent hypergeometric kernel determinant on multiple large intervals (with Lun Zhang and Zhengyang Zhao) <i>Submitted.</i> Publications in refereed journals <ol style="list-style-type: none">Painlevé transcendents in the defocusing mKdV equation with non-zero boundary conditions (with Engui Fan and Zhaoyu Wang) <i>Communications in Mathematical Physics</i>, 406 (2025), 181.Soliton resolution and asymptotic stability of N-soliton solutions for the defocusing mKdV equation with finite density type initial data (with Engui Fan and Zechuan Zhang) <i>Physica D: Nonlinear Phenomena</i>, 472 (2025), 134526.Transient asymptotics of the modified Camassa-Holm equation (with Yiling Yang and Lun Zhang) <i>Journal of the London Mathematical Society</i>, 110 (2024), e12967.On the Cauchy problem of defocusing mKdV equation with finite density initial data: long-time asymptotics in soliton-less regions (with Engui Fan and Zechuan Zhang) <i>Journal of Differential Equations</i>, 372 (2023), 55-122.Large-time asymptotics to the focusing nonlocal modified Kortweg-de Vries equation with step-like boundary conditions (with Engui Fan) <i>Studies in Applied Mathematics</i>, 150 (2023), 1217-1273.Riemann-Hilbert approach for multisoliton solutions of generalized coupled fourth-order nonlinear Schrödinger equations (with Weiqi Peng and Shoufu Tian) <i>Mathematical Methods in the Applied Sciences</i>, 43 (2020), 865-880.	
Grants	– Shanghai Post-doctoral Excellence Program Certificate No. 2024100 “ <i>Riemann-Hilbert Method for Several Asymptotic Problems related to Universality from Integrable Systems and Random Matrix Theory</i> ” Role: Host	2024 – 2026

	– China Postdoctoral Science Foundation Certificate No. 2024M760480 <i>“Semiclassical Asymptotics and Universality for Nonlinear Integrable Shallow Water Wave Systems”</i> Role: Host	2024 –2026
Teaching activities	2019 – 2026 @Fudan – Spring, 2024: TA of Methods of Asymptotic Analysis (MATH630117). – Fall, 2021: TA of Calculus A (MATH120021.02). – Spring, 2020: TA of Calculus B (MATH120004.01) (Online). – Fall, 2019: TA of Calculus B (MATH120003.01).	
Scholarships and awards	2019 – 2024 @Fudan (Doctorate) – Graduation with Honors (Shanghai Outstanding Graduate), 2024. – Scholarship provided by Huatai Securities Technology, 2023. – Scholarship provided by Pacific Insurance Company, 2022. – Outstanding Doctoral Candidate Scholarship provided by Fudan University, 2021. – Doctoral Scholarship of the Year provided by Fudan University, 2019 – 2023. 2015 – 2019 @CUMT (Undergraduate) – Outstanding Undergraduates in China University of Mining and Technology, 2019.	
Co-organized activities	– (with Lun Zhang) Mini-workshop on Asymptotic Analysis, Fudan University, Shanghai, China, 5th–6th & 9th June, 2025.	
Attended activities	– Universality, Nonlinearity, and Integrability, In honor of Percy Deift, Seoul, Korea, 12–16 May, 2025. – The 2nd Workshop on Integrable Systems and Random Matrix Theory, Dongguan, China, 5–17 Jan, 2025. (<i>Invited talk: “<u>Transient asymptotics of the modified Camassa-Holm equation</u>”</i>) – Random Matrix Summer School, University of Michigan, Ann Arbor, USA, 17–28 June, 2024. – Random Matrices and Related Topics, Jeju island, Korea, 6–10 May, 2024. – The 15th Hemudu Forum on Integrable Systems, Ningbo, China, 24–26 Nov, 2023. (<i>Contributed talk: “<u>Integrable PDEs with nonzero boundary conditions: large-time asymptotics</u>”</i>) – Foundations of Computational Mathematics 2023 (FoCM2023), Paris, France, 12–21 June, 2023. – The 13rd Hemudu Forum on Integrable Systems, Ningbo, China, 15–17 Oct, 2021.	
Academic visits	– 31/03/2025 – 11/04/2025, Chongqing University, China. (Host: Yiling Yang) (I greatly appreciate for their warm hospitality)	

Other presentations Outreach talks

- “*Some asymptotic problems in mathematical physics*”, Shanghai Institute of Technical Physics, Shanghai, China, 29th April, 2025.

2019 – 2026 @Fudan Integrable Systems and Random Matrix Theory Seminar

- “*Fredholm determinants from Schrödinger type equations, and deformation of Tracy-Widom distribution*” (reading report), Oct, 2024.
- “*Biorthogonal measures, polymer partition functions, and random matrices*” (reading report), April, 2024.
- “*Painlevé type asymptotics for the Camassa-Holm equation*” (reading report), Oct, 2022.
- “*A Riemann-Hilbert approach to Fredholm determinants of Hankel composition operators: scalar-valued kernels*” (reading report), Sept – Oct, 2022.
- “*Primitive potentials and bounded solutions of the KdV equation*” (reading report), Sept. 2022.
- “*Soliton V. The gas: Fredholm determinants, analysis and the rapid oscillations behind the kinetic equation*” (reading report), May – June, 2022.
- “*Airy kernel determinant solutions to the KdV equation and integro-differential Painlevé equations*” (reading report), Mar, 2022.
- “*The defocusing nonlinear Schrödinger equation with step-like oscillatory initial data*” (reading report), Oct, 2022.
- “*Momenta spacing distributions in anharmonic and the higher order finite temperature Airy kernel*” (reading report), Oct, 2022.
- “*Long-Time behavior of the non-focusing nonlinear Schrödinger equation – a case study*” (reading report), April, 2022.
- “*On the origins of Riemann-Hilbert problems in mathematics*” (reading report), Mar, 2022.

Status

China – citizen

Languages

- Chinese (native)
- English

Computer skills

LaTeX, Mathematica, Matlab, HTML, C++, Javascript

Wednesday 6th August, 2025