

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 1. Confluent hypergeometric kernel determinant on multiple large intervals (with Lun Zhang and Zhengyang Zhao) <i>Submitted.</i> Publications in refereed journals 1. 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. 2. 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. 3. 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. 4. 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. 5. 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. 6. 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

	<ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> - 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) <ul style="list-style-type: none"> - Outstanding Undergraduates in China University of Mining and Technology, 2019. 	
Co-organized activities	<ul style="list-style-type: none"> - (with Lun Zhang) Mini-workshop on Asymptotic Analysis, Fudan University, Shanghai, China, 5th–6th & 9th June, 2025. 	
Attended activities	<ul style="list-style-type: none"> - 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. (Invited talk: <i>"Transient asymptotics of the modified Camassa-Holm equation"</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. (Contributed talk: <i>"Integrable PDEs with nonzero boundary conditions: large-time asymptotics"</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	<ul style="list-style-type: none"> - 31/03/2025 – 11/04/2025, Chongqing University, China. (Host: Yiling Yang) 	
Other presentations	Outreach talks <ul style="list-style-type: none"> - <i>"Some asymptotic problems in mathematical physics"</i>, Shanghai Institute of Technical Physics, Shanghai, China, 29th April, 2025. 2019 – 2026 @Fudan Integrable Systems and Random Matrix Theory Seminar <ul style="list-style-type: none"> - <i>"Fredholm determinants from Schrödinger type equations, and deformation of Tracy-Widom distribution"</i> (reading report), Oct, 2024. - <i>"Biorthogonal measures, polymer partition functions, and random matrices"</i> (reading report), April, 2024. - <i>"Painlevé type asymptotics for the Camassa-Holm equation"</i> (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

Monday 4th August, 2025