

Taiyang Xu

Fudan University

220 Handan Rd
200433, Shanghai, China

homepage: taiyangxu.github.io

Email: tyxu19 (YOU KNOW) fudan (DOT) edu (DOT) cn

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

	<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	@ Fudan (2019 – 2026) <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. 	
Activities attended	Conferences <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. (<u>Invited talk: “<i>Transient asymptotics of the modified Camassa-Holm equation</i>”</u>) – 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. (<u>Contributed talk: “<i>Integrable PDEs with nonzero boundary conditions: large-time asymptotics</i>”</u>) – 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. Summer schools <ul style="list-style-type: none"> – Random Matrix Summer School, University of Michigan, Ann Arbor, USA, 17–28 June, 2024. 	
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. @Fudan Integrable Systems and Random Matrix Theory Seminar (2019 – 2026) <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. 	

- “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	<ul style="list-style-type: none"> – Chinese (native) – English
Computer skills	\LaTeX , Mathematica, Matlab, HTML, C++, Javascript

Wednesday 23rd July, 2025