

# Taiyang Xu

## Fudan University

220 Handan Rd  
200433, Shanghai, China

homepage: taiyangxu.github.io

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

<b>Current Position</b>	<b>Fudan University</b> , Shanghai, China Department of Mathematics Postdoctoral Fellow (Mentor: Prof. Lun Zhang)	07/2024 – now
<b>Education</b>	<b>Fudan University</b> , 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> ”  <b>China University of Mining and Technology</b> , 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
<b>Research Interests</b>	Integrable PDEs, Random matrices theory, Determinantal point processes, Orthogonal polynomials, Asymptotic analysis, Riemann-Hilbert (RH) problems, Special functions, Painlevé equations.	
<b>Research Articles</b>	<b>Preprints</b> 1. Confluent hypergeometric kernel determinant on multiple large intervals (with Lun Zhang and Zhengyang Zhao) <i>Submitted.</i>  <b>Publications in refereed journals</b> 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.	
<b>Grants</b>	– 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 2024 –2026  
Certificate No. 2024M760480  
“Semiclassical Asymptotics and Universality for Nonlinear Integrable Shallow Water Wave Systems”  
Role: Host

**Teaching Activities @ Fudan (2019 – 2026)**

- 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 & Awards**

**2019 – 2024 (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 (Undergraduate)**

- Outstanding Undergraduates in China University of Mining and Technology, 2019.

**Seminars**

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

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

**Co-organized Activities**

- (with Lun Zhang) Mini-workshop on Asymptotic Analysis, Fudan University, Shanghai, China, 5th-6th & 9th June, 2025.

<b>Conferences</b>	<ul style="list-style-type: none"> <li>– Universality, Nonlinearity, and Integrability, In honor of Percy Deift, Seoul, Korea, 12-16 May, 2025.</li> <li>– 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>”)</li> <li>– Random Matrices and Related Topics, Jeju island, Korea, 6-10 May, 2024.</li> <li>– 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>”)</li> <li>– Foundations of Computational Mathematics 2023 (FoCM2023), Paris, France, 12–21 June, 2023.</li> <li>– The 13rd Hemudu Forum on Integrable Systems, Ningbo, China, 15 - 17 Oct, 2021.</li> </ul>
<b>Academic Visits</b>	– 31/03/2025 – 11/04/2025, Chongqing University, China. (Host: Yiling Yang)
<b>Summer Schools</b>	– Random Matrix Summer School, University of Michigan, Ann Arbor, USA, 17-28 June, 2024.
<b>Status</b>	<b>China</b> – citizen
<b>Languages</b>	<ul style="list-style-type: none"> <li>– Chinese (native)</li> <li>– English</li> </ul>
<b>Computer Skills</b>	$\LaTeX$ , Mathematica, Matlab, HTML, C++, Javascript

Saturday 19<sup>th</sup> July, 2025