

Taiyang XU

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Employment

Fudan University	Shanghai, China
<i>Postdoctoral Researcher</i> in the Department of Mathematics	2024 - Present
Mentor: <i>Lun Zhang</i>	

Education

Fudan University	Shanghai, China
<i>Ph.D. in Mathematics</i>	2019 - 2024
Thesis: <i>On the long-time asymptotics of the local and nonlocal mKdV equation under the nonzero background</i>	
Mentor: <i>Engui Fan</i>	
China University of Mining and Technology	Xuzhou, Jiangsu Province, China
<i>B.Sc. in Mathematics, Distinguished Honor</i>	2015 - 2019
Thesis: <i>Inverse scattering theory and integrability on several kinds of nonlinear evolution equations</i>	
Thesis advisor: <i>Shoufu Tian</i>	

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

- [6] Painlevé transcendents in the defocusing mKdV equation with non-zero boundary conditions (with Zhaoyu Wang and Engui Fan)
arXiv:2306.07073, submitted.
- [5] 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)
arXiv:2108.03650, submitted.

Publications in refereed journals

- [4] Transient asymptotics of the modified Camassa-Holm equation (with Yiling Yang and Lun Zhang)

Journal of the London Mathematical Society, 110 (2024), e12967.

[3] 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)

Journal of Differential Equations, 372 (2023), 55-122.

[2] Large-time asymptotics to the focusing nonlocal modified Kortweg-de Vries equation with step-like boundary conditions (with Engui Fan)

Studies in Applied Mathematics, 150 (2023), 1217-1273.

[1] Riemann-Hilbert approach for multisoliton solutions of generalized coupled fourth-order nonlinear Schrödinger equations (with Weiqi Peng and Shoufu Tian)

Mathematical Methods in the Applied Sciences, 43 (2020), 865-880.

Scholarships and Awards

Doctorate

- Graduation with Honors (Shanghai Outstanding Graduate), 2024.
- Huatai Securities Technology Scholarship, 2023.
- Scholarship by Pacific Insurance Company, 2022.
- Outstanding Doctoral Candidate Scholarship of Fudan University, 2021.
- Outstanding Doctoral Scholarship in the Academic Year of Fudan University, 2019-2023.

Undergraduate

- Outstanding Undergraduates in China University of Mining and Technology, 2015-2019.

Teaching Activities

2023/2024

- Spring, 2024: TA of Methods of Asymptotic Analysis (MATH630117), Fudan University.

2021/2022

- Fall, 2021: TA of Calculus A (MATH120021.02), Fudan University.

2019/2020

- Spring, 2020: TA of Calculus B (MATH120004.01), Fudan University (Online).
- Fall, 2019: TA of Calculus B (MATH120003.01), Fudan University.

Seminars

2024/2025

- RMT seminar in FDU (Oct, 2024): *Fredholm determinants from Schrödinger type equations, and deformation of Tracy-Widom distribution.*

2023/2024

- Graduate student seminar of RMT in FDU (April, 2024): *Biorthogonal measures, polymer partition functions, and random matrices.*

2022/2023

- Graduate student seminar of IS in FDU (Oct, 2022): *Painlevé type asymptotics for the Camassa-Holm equation.*
- Graduate student seminar of RMT in FDU (Sept - Oct, 2022): *A Riemann-Hilbert approach to Fredholm determinants of Hankel composition operators: scalar-valued kernels.*
- Graduate student seminar of IS in FDU (Sept, 2022): *Primitive potentials and bounded solutions of the KdV equation*, Fudan University.

2021/2022

- Graduate student seminar of IS in FDU (May - June, 2022): *Soliton V. The gas: Fredholm determinants, analysis and the rapid oscillations behind the kinetic equation.*
- Graduate student seminar of RMT in FDU (Dec, 2021 and Mar, 2022): *Airy kernel determinant solutions to the KdV equation and integro-differential Painlevé equations.*
- Graduate student seminar of IS in FDU (Oct, 2021): *The defocusing nonlinear Schrödinger equation with step-like oscillatory initial data.*
- Graduate student seminar of RMT in FDU (Oct, 2021): *Momenta spacing distributions in anharmonic and the higher order finite temperature Airy kernel.*

2020/2021

- Graduate student seminar of IS in FDU (April, 2021): *Long-Time behavior of the non-focusing nonlinear Schrödinger equation – a case study.*
- Graduate student seminar of RMT in FDU (Nov, 2020 and Mar, 2021): *On the origins of Riemann-Hilbert problems in mathematics.*

Conferences

2023/2024

- 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.

2022/2023

- Foundations of Computational Mathematics 2023 (FoCM2023), Paris, France, 12–21 June, 2023.

2021/2022

- The 13rd Hemudu Forum on Integrable Systems, Ningbo, China, 15 - 17 Oct, 2021.

Summer School

2023/2024

- Random Matrix Summer School, University of Michigan, Ann Arbor, USA, 17-28 June, 2024.

Talks and Lectures

2023/2024

- “*Integrable PDEs with nonzero (symmetric and asymmetric) boundary conditions: large-time and transient asymptotics*”, conference talk in the 15th Hemudu Forum on Integrable Systems, Ningbo, China, 24–26 Nov, 2023.