Taiyang XU / 徐太阳

Room 2104, Guanghua East Main Tower, Fudan University
220 Handan Rd, Shanghai
tyxu19@fudan.edu.cn
https://taiyangxu.github.io

Employment

Fudan University Shanghai, China

Postdoctoral Researcher in the Department of Mathematics 2024 - Present

Mentor: *Lun Zhang*

Education

Fudan University Shanghai, China

Ph.D. in Mathematics 2019 - 2024

Thesis: *On the long-time asymptotics of the local and nonlocal mKdV equation under the nonzero background* / 非零背景下局域和非局域 *mKdV* 方程–解的长时间渐近分析

Mentor: *Engui Fan*

China University of Mining and Technology Xuzhou, Jiangsu Province, China

B.Sc. in Mathematics, Distinguished Honor 2015 - 2019

Thesis: *Inverse scattering theory and integrability on several kinds of nonlinear evolution equations* / 几类非线性发展方程的反散射方法及其可积性质的研究

Thesis advisor: *Shoufu Tian*

Research Interests

Integrable PDEs, Random matrices theory, Determinantal point processes, Orthogonal polynomials, Asymptotic analysis, Riemann-Hilbert (RH) problems, Special functions, Painlevé equations.

Grants

– The 76th China Postdoctoral Science Foundation, 2024-2026. / 中国博士后科学基金第 76 批面上资助.

Research Articles

Preprints

1. Painlevé transcendents in the defocusing mKdV equation with non-zero boundary conditions (with Zhaoyu Wang and Engui Fan)
   (arXiv:2306.07073).

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)
   (arXiv:2108.03650).

Publications in refereed journals

1. Transient asymptotics of the modified Camassa-Holm equation (with Yiling Yang and Lun Zhang)
   Journal of the London Mathematical Society, 110 (2024), e12967.
   (DOI: 10.1112/jlms.12967) (arXiv:2308.06950)

2. 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.
   (DOI: 10.1016/j.jde.2023.06.038) (arXiv:2108.06284)

3. 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.
   (DOI: 10.1111/sapm.12568) (arXiv:2208.01268)

4. 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.
   (DOI: 10.1002/mma.5964)

Scholarships and Awards

Doctorate

– Graduation with Honors (Shanghai Outstanding Graduate), 2024. / 上海市优秀毕业生 (研究生).
– Scholarship provided by Huatai Securities Technology, 2023. / 华泰证券科技奖学金.
– Scholarship provided by Pacific Insurance Company, 2022. / 太平洋保险奖学金.
– Outstanding Doctoral Candidate Scholarship provided by Fudan University, 2021. / 优秀博士候选人奖学金.
– Doctoral Scholarship of the Year provided by Fudan University, 2019-2023. / 博士生学年学业奖学金.

Undergraduate

– Outstanding Undergraduates in China University of Mining and Technology, 2015-2019. / 中国矿业大学优秀毕业生.

Teaching Activities

– Spring, 2024: TA of Methods of Asymptotic Analysis (MATH630117), Fudan University.
– Fall, 2021: TA of Calculus A (MATH120021.02), Fudan University.
– Spring, 2020: TA of Calculus B (MATH120004.01), Fudan University (Online).
– Fall, 2019: TA of Calculus B (MATH120003.01), Fudan University.

Seminars

("RMT = Random Matrix Theory", "IS = Integrable Systems". Here I only list those talks given by myself.)
– RMT seminar in FDU: *Fredholm determinants from Schrödinger type equations, and deformation of Tracy-Widom distribution*, Oct, 2024.
– RMT seminar in FDU: *Biorthogonal measures, polymer partition functions, and random matrices*, April, 2024.
– IS seminar in FDU: *Painlevé type asymptotics for the Camassa-Holm equation*, Oct, 2022.
– RMT seminar in FDU: *A Riemann-Hilbert approach to Fredholm determinants of Hankel composition operators: scalar-valued kernels*, Sept - Oct, 2022.
– IS seminar in FDU: *Primitive potentials and bounded solutions of the KdV equation*, Sept, 2022.
– IS seminar in FDU: *Soliton V. The gas: Fredholm determinants, analysis and the rapid oscillations behind the kinetic equation*, May - June, 2022.
– RMT seminar in FDU: *Airy kernel determinant solutions to the KdV equation and integro-differential Painlevé equations*, Dec, 2021 and Mar, 2022.
– IS seminar in FDU: *The defocusing nonlinear Schrödinger equation with step-like oscillatory initial data*, Oct, 2021.
– RMT seminar FDU : *Momenta spacing distributions in anharmonic and the higher order finite temperature Airy kernel*, Oct, 2021.
– IS seminar in FDU: *Long-Time behavior of the non-focusing nonlinear Schrödinger equation – a case study*, April, 2021.
– RMT seminar in FDU: *On the origins of Riemann-Hilbert problems in mathematics*, Nov, 2020 and Mar, 2021.

Conferences

("*" indicates that I gave a talk.)

– 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 ("*Integrable PDEs with nonzero (symmetric and asymmetric) boundary conditions: large-time and transient asymptotics*").

– 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 School

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

Ohter Credits

arXiv, Scopus, Google Scholar Profile, MathSciNet as well as ORCID.