Taiyang Xu

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EDUCATION

Fudan University, Shanghai, China — Sept, 2019 – Present
Ph.D. Candidate in Mathematics, supervised by Prof. Engui Fan and Prof. Lun Zhang
Thesis title: "TBA"

CUMT, Xuzhou, Jiangsu Province, China — Sept, 2015 – June, 2019
(CUMT represents "China University of Mining and Technology")
B.Sc. in Mathematics, Distinguished Honor, supervised by Prof. Shoufu Tian
Thesis title: "Inverse scattering theory and integrability on several kinds of nonlinear evolution equations"

RESEARCH INTERESTS

I'm an analyst who works in the area of mathematical physics and applied mathematics. In particular, I'm interested in:

- Integrable systems (IS) with Lax representation. I'm mainly concerned about the long-time behavior of nonlinear partial differential equations.
- Random matrix theory (RMT), Orthogonal polynomials (OPs) and related Fredholm determinant theory.
- Riemann-Hilbert problem is the main tool used by me to study physically meaningful quantities arising in the field of RMT or IS, in particular their asymptotics associated to special functions and Painlevé family equations.

PUBLICATIONS

Preprints

- (with Y. Yang and L. Zhang) On the Cauchy problem of mCH equation: long-time asymptotics in Painlevé regions and collisionless shock region, in preparation.
- (with E. Fan) On the Cauchy problem of defocusing mKdV equation: long-time asymptotics with step-like initial data, submitted, 2022.
- (with Z. Zhang and E. Fan) Soliton resolution and asymptotic stability of N-soliton solutions for the defocusing mKdV equation with finite density type initial data, submitted, 2021.

Publications in Refereed Journals

- (with Z. Zhang and E. Fan) On the Cauchy problem of defocusing mKdV equation with finite density initial data: long-time asymptotics in soliton-less regions, Journal of Differential Equations, 372 (2023), 55-122.
- (with E. Fan) Large-time asymptotics to the focusing nonlocal modified Kortweg-de Vries equation with step-like boundary conditions, Studies in Applied Mathematics, 150 (2023), 1217-1273.
- (with S. Tian and W. Peng) Riemann-Hilbert approach for multisoliton solutions of generalized coupled fourth-order nonlinear Schrödinger equations, Mathematical Methods in the Applied Sciences, 43 (2020), 865-880.

TEACHING ACTIVITIES

Undergraduate Teaching:

- Teaching Assistant (TA) of MATH120021.02, Calculus A. Fall, 2021, Fudan University,.
- Teaching Assistant (TA) of MATH120004.01 (Online), Calculus B. Spring, 2020, Fudan University,
- Teaching Assistant (TA) of MATH120003.01, Calculus B. Fall, 2019, Fudan University.

SEMINARS

Seminars are selected as follows:

- Graduate student seminar: *Painlevé type asymptotics for the Camassa-Holm equation.* Fudan University, 11st and 13rd, Oct, 2022.
- Graduate student seminar: *A Riemann-Hilbert approach to Fredholm determinants of Hankel composition operators: scalar-valued kernels.* Fudan University, 19th, Sept – 10th, Oct, 2022. (Monday of every week)
- Graduate student seminar: *Primitive potentials and bounded solutions of the KdV equation.* Fudan University, 8th, Sept, 2022.
- Graduate student seminar: *Soliton V. The gas: Fredholm determinants, analysis and the rapid oscillations behind the kinetic equation.* Fudan University, 20th, May – 10th, June, 2022. (Friday of every week)
- Graduate student seminar: *Airy kernel determinant solutions to the KdV equation and integro-differential Painlevé equations.* Fudan University, 23rd, Dec, 2021 – 10th, Mar, 2022. (Thursday of every week)
- Graduate student seminar: *The defocusing nonlinear Schrödinger equation with step-like oscillatory initial data.* Fudan University, Sept – Oct, 2021.
- Graduate student seminar: *Momenta spacing distributions in anharmonic and the higher order finite temperature Airy kernel.* Fudan University, 12nd, May – 9th, Oct, 2021. (Thursday of every week)
- Graduate student seminar: *Long-Time behavior of the non-focusing nonlinear Schrödinger equation – a case study.* Fudan University, April, 2021.
- Graduate student seminar: *On the origins of Riemann-Hilbert problems in mathematics.* Fudan University, 27th, Nov, 2020 – 17th, Mar, 2021. (Friday of every week in 2020, Wednesday of every week in 2021)

CONFERENCES

Conferences are selected as follows:

- Foundations of Computational Mathematics 2023 (FoCM2023), Sorbonne Université, Paris, France, 12–21 June, 2023.
- Random Matrix EurAsia 2022, Institute for Mathematical Sciences (IMS), National University of Singapore, Singapore, 18 April–13 May, 2022.
- The 13th Hemudu Forum and Seminar on Frontier Issues of Integrable Systems, Ningbo University, Ningbo, China, 15–17 Oct, 2021.

LANGUAGES

- Chinese (native speaker, include mandarin and Sichuan hua)
- English
- Germany (beginner)

OTHER INTERESTS

- Football. I'm a super fan of Manchester United (UK) and FC Barcelona (Spain). My favorite football player is Lionel Messi (Argentina).
- Basketball. I enjoy the teamwork of the Golden State Warriors (a basketball team associated to NBA, USA) and I like "Chef" Curry's playing style.
- Movies. Woody Allen (Midnight in Paris …), Ang Lee (Eat Drink Man Woman, Pushing Hands …), Richard Linklater (Before sunset/sunrise/midnight …), Quentin Tarantino (Kill Bill, The Hateful Eight …), Edward Yang (Yi yi, A Brighter Summer Day …), ……

July 4, 2023