

# Taiyang Xu

Fudan University

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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 matrices 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) Transient asymptotics of the modified Camassa-Holm equation, in preparation.
- (with Z. Wang and E. Fan) Painlevé type asymptotics of defocusing mKdV equation with a nonzero background, 2023.
- (with E. Fan) On the Cauchy problem of defocusing mKdV equation: long-time asymptotics with step-like initial data, 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, *J. 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, *Stud. Appl. Math.*, 150 (2023), 1217-1273.
- (with S. Tian and W. Peng) Riemann-Hilbert approach for multisoliton solutions of generalized coupled fourth-order nonlinear Schrödinger equations, *Math. Methods Appl. Sci.*, 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 in FDU: *Painlevé type asymptotics for the Camassa-Holm equation*.
- Graduate student seminar in FDU: *A Riemann-Hilbert approach to Fredholm determinants of Hankel composition operators: scalar-valued kernels*.
- Graduate student seminar in FDU: *Primitive potentials and bounded solutions of the KdV equation*, Fudan University.
- Graduate student seminar in FDU: *Soliton V. The gas: Fredholm determinants, analysis and the rapid oscillations behind the kinetic equation*.
- Graduate student seminar in FDU: *Airy kernel determinant solutions to the KdV equation and integro-differential Painlevé equations*.
- Graduate student seminar in FDU: *The defocusing nonlinear Schrödinger equation with step-like oscillatory initial data*.
- Graduate student seminar in FDU: *Momenta spacing distributions in anharmonic and the higher order finite temperature Airy kernel*.
- Graduate student seminar in FDU: *Long-Time behavior of the non-focusing nonlinear Schrödinger equation – a case study*.
- Graduate student seminar in FDU: *On the origins of Riemann-Hilbert problems in mathematics*.

## 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 6, 2023*