Fudong Wang, Ph.D.

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Education

2015 – 2021 **Ph.D., Pure and Applied Math, University of South Florida** GPA: 3.85/4.
Dissertation: *Long-time asymptotics for the AKNS hierarchy of MKdV-type equations with defocusing/focusing reductions in some L^2 Sobolev spaces.*
Advisor: *Wen-Xiu Ma*

2011 – 2015 **B.S. Pure and Applied Math, Zhejiang University of Technology** GPA:4.7/5
Thesis: *Painlevé analysis to some nonlinear PDEs.*
Advisor: *Shoufeng Shen*

Employment History

2021 – Now **Postdoc,** Department of Mathematics, Uinversity of Central Florida
Mentor: Alexander Tovbis

2018 – 2021 **Graduate Teaching Associates,** Department of Mathematics and Statistics, University of South Florida

2015 – 2018 **Graduate Instructional Assistants,** Department of Mathematics and Statistics, University of South Florida

Research Interests

Current Soliton/Breather gas, Finite-gap solution, Rogue waves, Modulation Instability, Riemann-Hilbert problem, Singular Integral equations

Future Orthogonal Polynomial, Random Matrices, Potential theory, Complex analysis, Free boundary problem.

Research Publications

1. Recent developments in spectral theory of the focusing NLS soliton and breather gases: the thermodynamic limit of average densities, fluxes and certain meromorphic differentials; periodic gases, *Journal of Physics A [to appear]*, **2022**. (with Alexander Tovbis)

2. A $\bar{\partial}$-Steepest Descent Method for Oscillatory Riemann–Hilbert Problems, *Journal of Nonlinear Science*, **2022**. (with Wen-Xiu Ma)

3. A Note on Electrified Droplets, *Computational Methods and Function Theory*, **2021**.(with Nathan Hayford)

4. Inverse scattering transforms for non-local reverse-space matrix non-linear Schrödinger equations, *European Journal of Applied Mathematics*, **2021**. (with Wen-Xiu Ma, Yehui Huang)

5. Inverse scattering transforms and soliton solutions of nonlocal reverse-space nonlinear Schrödinger hierarchies, *Studies in Applied Mathematics*, **2020**. (with Wen-Xiu Ma, Yehui Huan)

6. Lump solutions to nonlinear PDEs involving Hirota derivative $D_t^2 D_x D_y$, *Modern Physics Letters B*, **2020**. (with Wen-Xiu Ma)

Academic Activities

Invited Conference Talks

Sep, 2022(2) Workshop on Analysis of dispersive hydrodynamic systems, The Isaac Newton Institute, **Cambridge University**, UK.
Presentation: *Recent Developments in Spectral Theory of Focusing NLS Soliton Gases: Average Densities, Fluxes and Periodic Gases.*

Sep, 2022(1) SIAM Conference on Nonlinear Waves and Coherent Structures (NWCS22), **University of Bremen**, Bremen, Germany.
Presentation: *Recent developments in spectral theory of the focusing NLS soliton/breather gases.*

Jun, 2022 Workshop on Nonlinear and Modern Mathematical Physics, **Florida Agricultural and Mechanical University**, Tallahassee, FL.
Presentation: *Recent developments in spectral theory of the focusing NLS.*

Apr, 2022 The Twelfth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory, **University of Georgia**, Athens, GA.
Presentation: *Recent developments in spectral theory of the focusing NLS soliton/breather gases.*

Oct, 2021 Integrable Systems and Random Matrix Theory Seminar, **University of Michigan**, MI.
Presentation: *A dbar-steepest descent analysis for the long-time asymptotic behavior of oscillatory Riemann-Hilbert problems.*

May, 2019 Workshop on Nonlinear and Modern Mathematical Physics, **University of Hawaii at Manoa**, Honolulu, HI.
Presentation: *Long-time asymptotics for the AKNS system.*

Mathematical Physics Seminar @ University of Central Florida

Jun, 2022 Elliptic solutions to the KP hierarchy and elliptic Calogero-Moser model.

Nov, 2021 Integral equation of the first kind with logarithmic kernel.

Sep, 2021 Continuum limit of theta function.

Duties for Refereed Journals

2020 - 2022 **Reviewer for:** *Proceedings of the Royal Society A, Nonlinearity, Studies in Applied Mathematics, SIAM Journal on Mathematical Analysis, Partial Differential Equations in Applied Mathematics*.

2021 - 2022 **Guest Editor for:** *Partial Differential Equations in Applied Mathematics*

Analysis Seminar Talks @ University of South Florida

Oct, 2020 Asymptotics of oscillatory matrix Riemann-Hilbert problems by dbar-steepest descent method

Differential Equations Seminar Talks @ University of South Florida

Sep, 2020 Derivation of the NLS equation from Maxwell's Equations

Apr, 2020 L^2-bijectivity of scattering and inverse scattering in some Sobolev spaces.

Oct, 2019 $\bar{\partial}$ method and its application to nonlinear evolution equations.

Sep, 2019 Inverse scattering and N-soliton solution for the nonlocal nonlinear Schrödinger equation.

Apr, 2019 Riemann-Hilbert problems for two-component coupled mKdV systems.

Academic Activities (continued)

- Mar, 2019 — Asymptotic solutions of the nonlinear Schrödinger equation based on conservation laws.
- Oct, 2018 — The emergence of solitons of the Korteweg-de Vries Equation from sufficiently decaying initial conditions.
- Apr, 2018 — Nonlinear steepest descent method for long-time asymptotic for MKdV.
- Mar, 2017 — Riemann-Hilbert problems with zeros.

Gradute Math Seminar Talks @ University of South Florida

- Oct, 2021 — The Continuum Limit of Theta Functions.
- March, 2021 — A short Introduction to the Theta Functions.
- May, 2020 — An elementary introduction to Fredholm Determinant.
- Mar, 2020 — Introduction to the Riemann-Hilbert Problem in L^p-space.
- Oct, 2019 — What is ... inverse scattering?
- Sep, 2019 — An Introduction to the Riemann-Hilbert Problems on the real line.
- Jun, 2019 — Some fundamental formulas(Plemelj-Privalov) on the Cauchy-type integrals.

Summer School

- Jun, 2022 — Attended Random Matrix Summer School at **University of Michigan.**

Seminar Organizer

- 2019 – 2021 — Graduate Math @ USF Seminar, as co-Founder (with Nathan Hayford).
  Website: https://usfmath.github.io
  Achievements: *Hosted more than 30 seminars.*

Teaching Experience

As an Instructor

- Fall, 2022 — MAP 4113 - Probability, Random Processes and Applications
  Course content includes: *Elementary probability theory, random process, modes of convergence, central limit theory*
- Spring, 2022 — MAS 3106 — Linear Algebra
  Course content includes: *Concentrated on proofs, abstract linear algebra.*
- Fall, 2021 — MAS 3105 — Matrix and Linear Algebra
  Course content includes: *Concentrated on computation side of matrix, QR decomposition, determinants, projections, least-square approximation.*
- Fall, 2019 — MAC 2312 — CALCULUS II
  Course content includes: *Integrals, Techniques of Integration, Applications of Integration, Series.*

As a Grader

- MAC 2283 — ENGINEERING CALCULUS III
- COP 4313 — SYMBOLIC COMPUTATIONS IN MATHEMATICS
- MAD 4401 — NUMERICAL ANALYSIS I
- MAA 4212 — INTERMEDIATE ANALYSIS II

Teaching Experience (continued)

- MAP 4341 — INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS

Scholarships and Awards

Scholarships

2017, 2019 — **Fred L. and Helen M. Tharp Scholarship**, USF

2015 – 2021 — **Teaching Assistantships**, USF

2012 – 2014 — **The First Prize Scholarship**, ZJUT

Awards

2013 — **Meritorious Winner**, Mathematical Contest In Modeling(MCM)

2012 — **First Prize**, National College Mathematics Competition in Zhejiang Province

References

Alexander Tovbis: alexander.tovbis@ucf.edu

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Wen-Xiu Ma: wma3@usf.edu

Evguenii Rakhmanov: rakhmano@usf.edu

Seung-Yeop Lee: lees3@usf.edu

Dmitry Khavinson: dkhavins@usf.edu