# 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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