Yuzhou Joey Zou

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Research Interests

Microlocal Analysis, Inverse Problems, Partial Differential Equations.

Employment

2022– Northwestern University, Boas Assistant Professor
Postdoctoral mentor: Jared Wunsch

2021–2022 University of California, Santa Cruz, Postdoctoral Scholar-Employee
Postdoctoral mentor: François Monard

Education

2016–2021 Stanford University, Ph.D. in Mathematics
Thesis advisor: András Vasy
Thesis title: *Microlocal analysis with applications to seismic inverse problems*

2012–2016 University of Chicago, B.S. with honors in Mathematics and B.A. in Chemistry
GPA: 3.83

Publications

[9] "**Asymptotic Expansion of the Eigenvalues of a Bathtub Potential with Quadratic Ends**". Preprint, 2024. arXiv:2408.09816.

[8] "**The hyperbolic X-ray transform: new range characterizations, mapping properties and functional relations**", joint work with Nikolas Eptaminitakis and François Monard. Preprint, 2024. arXiv:2405.02521.

[7] "**Helmholtz quasi-resonances are unstable under most single-signed perturbations of the wave speed**", joint work with Euan A. Spence and Jared Wunsch. Preprint, 2024. arXiv:2402.00843.

[6] "**The Morse index theorem for mechanical systems with reflections**", joint work with Jared Wunsch and Mengxuan Yang. *Nonlinearity*, Vol. 37, no. 8. 2024. DOI: 10.1088/1361-6544/ad5636.

[5] "**Boundary triples for a family of degenerate elliptic operators of Keldysh type**", joint work with François Monard. *Pure and Applied Analysis*, Vol. 6, no. 2, 541-580. 2024. DOI: 10.2140/paa.2024.6.541.

[4] "**The C^∞-isomorphism property for a class of singularly-weighted X-ray transforms**", joint work with Rohit K. Mishra and François Monard. *Inverse Problems*, Vol. 39, no. 2. 2023. DOI: 10.1088/1361-6420/aca8cb.

[3] "**Microlocal Methods for The Elastic Travel Time Tomography Problem for Transversely Isotropic Media**". Preprint, 2021. arXiv:2112.14455.

[2] "**Streak artifacts from non-convex metal objects in X-ray tomography**", joint work with Yiran Wang. *Pure and Applied Analysis*, Vol. 3, no. 2, 295-318. 2021. DOI: 10.2140/paa.2021.3.295.

[1] "**Partial Global Recovery in the Elastic Travel Time Tomography Problem for Transversely Isotropic Media**". *Annales de l'Institut Fourier*, Vol. 74, no. 5, 2077-2139. 2024. DOI: 10.5802/aif.3617.

Expository Papers

[2] "**Entropy and kinetic formulations of conservation laws**".
Written at the University of Chicago Mathematics REU 2015.

[1] "**Modes of convergence for Fourier series**".
Written at the University of Chicago Mathematics REU 2014.

Awards and honors

2021	Mathematics Distinguished Service Award, Dept. of Mathematics, Stanford University
2019	Robert Osserman Teaching Award, Dept. of Mathematics, Stanford University
2018, 2016	Honorable Mention, NSF Graduate Research Fellowship
2016	Paul R. Cohen Memorial Prize, University of Chicago Dept. of Mathematics Awarded to top graduating mathematics majors
2016	1st prize at the 23rd International Mathematics Competition, Blagoevgrad, Bulgaria (19th place overall)
2015	Honorable Mention, Putnam Exam

Teaching

Instructor, Northwestern University
Duties: write and give lectures, write homework and exams.

Spring	2024	Math 220-2	Single-Variable Differential Calculus 2
Winter	2024	Math 220-2	Single-Variable Differential Calculus 2
Winter	2023	Math 230-2	Multivariable Integral Calculus
Autumn	2022	Math 220-1	Single-Variable Differential Calculus 1

Instructor, University of California, Santa Cruz
Duties: write and give lectures, write homework and exams.

Spring	2022	Math 218	Advanced Parabolic and Hyperbolic Partial Differential Equations
Winter	2022	Math 121A	Differential Geometry

Instructor, Stanford University
Duties: write and give lectures, write homework and exams.

Summer*	2021	Math 19	Single Variable Calculus 1
Summer*	2020	Math 19	Single Variable Calculus 1

* - conducted online

Administrative Teaching Assistant, Stanford University
Duties: manage course logistics for a large ($\sim$ 300 students) course (e.g. arrange exam logistics, manage homework/exam grading, maintain course website, answer student emails, etc.), hold office hours, grade exams.

Spring*	2021	Math 51	Linear Algebra and Multivariable Calculus
Winter	2020	Math 51	Linear Algebra and Multivariable Calculus
Autumn	2018	Math 51	Linear Algebra and Multivariable Calculus

* - conducted online

Teaching Assistant, Stanford University
Duties: lead discussion sections, hold office hours, grade exams.

Winter	2018	Math 51	Linear Algebra and Multivariable Calculus

Course Assistant, Stanford University
Duties: hold office hours, grade homework and exams, write solutions.

Autumn	2019	Math 205A	Graduate Real Analysis 1
Summer	2019	Math 19	Single Variable Calculus 1
Winter	2019	Math 205B	Graduate Real Analysis 2
Autumn	2017	Math 171	Fundamental Concepts of Analysis
Spring	2017	Math 172	Lebesgue Integration and Fourier Analysis
Autumn	2016	Math 20	Single Variable Calculus 2

Graduate Assistant, Stanford Online High School
Duties: help various aspects of Stanford Online High School operations, including researching high school math curricula, grading for various courses, etc..

Winter	2021	Research and Teaching Assistant
Autumn	2020	Research and Teaching Assistant

Reader, University of Chicago
Duties: grade homework.

Winter	2016	Math 255	Abstract Algebra 2
Autumn	2015	Math 254	Abstract Algebra 1
Spring	2015	Math 205	Analysis in $\mathbb{R}^n$ 3
Winter	2015	Math 204	Analysis in $\mathbb{R}^n$ 2
Autumn	2014	Math 203	Analysis in $\mathbb{R}^n$ 1

Junior Tutor, University of Chicago
Duties: lead discussion section, grade homework.

Spring	2014	Math 133	Elementary Functions and Calculus 3
Winter	2014	Math 132	Elementary Functions and Calculus 2
Autumn	2013	Math 131	Elementary Functions and Calculus 1

Invited Conference Talks

Oct	2024	Special Session on Harmonic Analysis, Partial Differential Equations, and Spectral Theory, 2024 AMS Fall Western Sectional
Oct	2024	Triangle Area Inverse Problems Weekend, NC State University
Aug	2024	Geometric Inverse Problems Summer School, UC Santa Cruz
Jun	2024	Great Lakes Mathematical Physics Meeting, Michigan State University
May	2024	SIAM Conference on Imaging Science, Atlanta
Mar	2024	Ohio River Analysis Meeting, University of Kentucky
Feb	2024	Texas Analysis and Mathematical Physics Symposium, Texas A&M University
Oct	2023	Spectral Theory and Applications, Texas A&M University
Sep	2023	Applied Inverse Problems 2023, Göttingen, Germany
Jun	2023	Special Session on Inverse Problems and Imaging, The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications
Aug	2022	Inverse Problems in Analysis and Geometry, Helsinki

Jul 2022 Workshop on Microlocal Analysis & PDEs, University College London
Dec 2021 Session on "Geometric Tomography and Microlocal Analysis", 2021 CMS Winter Meeting
Aug 2021 Inverse problems and nonlinearity, Helsinki

Invited Seminar Talks

Oct 2024 Baby Inverse Problems Seminar (online)
Oct 2024 Inverse Problems Seminar, UC Irvine
Sep 2024 Analysis and Applied Mathematics Seminar, University of Illinois, Chicago
Dec 2023 Spectral and Scattering Theory Seminar, Purdue University
Nov 2023 University College London
Oct 2023 Analysis & PDE Seminar, UC Berkeley
Oct 2023 Geometry & Analysis Seminar, UC Santa Cruz
Oct 2023 Analysis & PDE Seminar, Stanford University
Sep 2023 Analysis & Differential Geometry Seminar, Emory University
Apr 2023 PDE Seminar, Northwestern University
Apr 2023 Inverse Problems Seminar, University of Washington
Oct 2022 Analysis Seminar, Northwestern University
Oct 2022 Geometry and Topology Seminar, NC State University
May 2022 Analysis and PDE Seminar, University of Kentucky
Apr 2022 International Zoom Inverse Problems Seminar, UC Irvine
Oct 2021 Geometry and Analysis Seminar, UC Santa Cruz
Sep 2021 HADES Seminar, UC Berkeley
May 2020 Geometry and Analysis Seminar, UC Santa Cruz
Mar 2020 Differential Geometry & PDE Seminar, University of Washington
Feb 2020 Analysis & PDE Seminar, Stanford University
Feb 2020 HADES Seminar, UC Berkeley
Dec 2019 Graduate Student Seminar, Microlocal Analysis Program, MSRI

Conferences Organized

Jun 2024 Microlocal Analysis and Quantum Dynamics
Summer school and conference, Northwestern University

Seminars Organized

2023-2024 Analysis Seminar, Northwestern University (co-organized)
Winter 2018 Student Analysis Seminar, Stanford University
Autumn 2017 Kiddie Colloquium, Stanford University

Recent Conferences and Workshops Attended

Oct 2024 "AMS Fall Western Sectional Meeting", UC Riverside
Oct 2024 "Triangle Area Inverse Problems Weekend", NC State University
Aug 2024 "Summer School: Geometric Inverse Problems and Inverse Problems for Elliptic Equations", UC Santa Cruz

Jul	2024	"NU Trends in Ergodic Theory", Northwestern University
Jun	2024	"Microlocal Analysis and Quantum Dynamics', Northwestern University
Jun	2024	"Great Lakes Mathematical Physics Meeting", Michigan State University
May	2024	"SIAM Conference on Imaging Sciences (IS24)", Atlanta, GA
May	2024	"From Microlocal to Global Analysis @ MIT", MIT
Mar	2024	"13th Ohio River Analysis Meeting", University of Kentucky
Feb	2024	"Texas Analysis and Mathematical Physics Symposium", Texas A&M University
Nov	2023	"Spectral and Resonance Problems for Imaging, Seismology and Materials Science", University of Reims Champagne-Ardenne, France
Nov	2023	"Mentoring in the Mathematical Sciences", Rice University
Oct	2023	"Spectral Theory and Applications", Texas A&M University
Sep	2023	"Applied Inverse Problems 2023", Göttingen, Germany
Aug	2023	"Workshop on Mathematical Trends in Medical Imaging", University of Chicago
Jul	2023	"Inverse Problems and Nonlinearity", Banff International Research Station, Canada
Jun	2023	"The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications", Wilmington, NC
May	2023	"May Midwestern Microlocal Meeting", Northwestern University
May	2023	"TEACHx 2023", Northwestern University

Mentoring and Outreach

Autumn	2021	Directed Reading Program, University of California, Santa Cruz *–Directed undergraduate reading project in Fourier analysis.*
Autumn to Spring	2019 2021	TA Mentoring Program, Stanford University (5 quarters) *–Mentored first-time teaching assistants by observing sections and providing feedback.*
Spring to Spring	2017 2021	Directed Reading Program, Stanford University (9 quarters) *–Directed undergraduate reading projects in Fourier analysis, complex analysis, ergodic theory, geometric measure theory, Ramsey theory, Markov chains, and distribution theory.*
Autumn	2020	Workshop on best teaching practices for graduate students, Stanford University *–Moderated a panel regarding effective strategies for being an effective TA.*
Summer	2016	Summer Analysis Bootcamp, University of Chicago *–Teaching assistant for summer program for advanced undergraduates in analysis.*
Summer	2013	Young Scholars Program, University of Chicago *–Teaching assistant for summer math program for high school students.*
Summer	2013	SESAME Program, University of Chicago *–Teaching assistant for certification program for middle school mathematics teachers.*
Spring	2013	Neighborhood Schools Program, University of Chicago *–Tutor for after-school program at local elementary schools*

Other Information

Languages (natural):	Mandarin Chinese (native), English (native), Cantonese (basic)
Languages (computer):	Python (proficient), LaTeX (proficient)
Citizenship:	United States of America

Last updated November 1, 2024