JIAN ZHAI

Associate Professor, School of Mathematical Sciences, Fudan University
2016 Guanghua East Tower, 220 Handan Road, Shanghai 200433, China
jianzhai@fudan.edu.cn   http://jianzhai.github.io

EMPLOYMENT

Associate Professor, School of Mathematical Sciences, **Fudan University**, Sep. 2021 - Now.

Postdoctoral Fellow, Institute for Advanced Study, **The Hong Kong University of Science and Technology**, Mar. 2019 - Sep. 2021.

Visiting Lecturer, Department of Mathematics, **University of Washington**, Sep. 2018 - Mar. 2019.

Postdoctoral Fellow, Department of Computational and Applied Mathematics, **Rice University**, July 2018 - Aug. 2018.

EDUCATION

Rice University   May 2018
Ph.D. in Computational and Applied Mathematics
Advisor: Prof. Maarten V. de Hoop

Purdue University   Aug. 2013 - Aug. 2015
Graduate program in Mathematics
Advisor: Prof. Maarten V. de Hoop

Fudan University   Jun. 2013
M. S. in Mathematics
Advisor: Prof. Jin Cheng

Sichuan University   Jun. 2010
B. S. in Mathematics

RESEARCH INTERESTS

- Inverse Problems, Ill-posed Problems
- Partial Differential Equations
- Microlocal Analysis
- Spectral theory
- Scientific Computing

PUBLICATIONS

- Determination of the density in the linear elastic wave equation, *preprint*, arXiv:2503.12825.
- (with G. Uhlmann) Invertibility of local geodesic transverse and mixed ray transforms II: higher order tensors, *preprint*, arXiv:2402.12640.

- (with G. Uhlmann) Invertibility of local geodesic transverse and mixed ray transforms I: basic cases, *preprint*, arXiv:2401.09017.

- (with G. Uhlmann) Determination of the density in a nonlinear elastic wave equation, *Math. Ann.*, **390** (2024) 2825-2858.

- (with S. Lu) Increasing stability of a linearized inverse boundary value problem for a nonlinear Schrödinger equation on transversally anisotropic manifolds, *Inverse Problems*, **40** (2024) 045003.

- (with Y. Zhao) Determination of piecewise homogeneous sources for elastic and electromagnetic waves, *Inverse Probl. Imaging*, **3** (2023) 614-628.

- (with R. Lai, G. Uhlmann and H. Zhou) Single pixel X-ray transform and related inverse problems, *SIAM J. Imaging Sci.*, **15** (2022) 1894-1909.

- (with S. Acosta and G. Uhlmann) Nonlinear ultrasound imaging modeled by a Westervelt equation, *SIAM J. Appl. Math.*, **15** (2022) 408-426.

- (with P. Hintz and G. Uhlmann) The Dirichlet-to-Neumann map for a semilinear wave equation on Lorentzian manifolds, *Comm. P.D.E.*, **47** (2022) 2363-2400.

- (with G. Bao and X. Xu) Inverse spectral problem for a damped wave operator, *SIAM J. Appl. Math.*, **81** (2021) 1799-1820.

- (with P. Li and Y. Zhao) Lipschitz stability for an inverse source scattering problem at a fixed frequency, *Inverse Problems*, **37** (2021) 025003.

- (with P. Hintz and G. Uhlmann) An inverse boundary value problem for a semilinear wave equation on Lorentzian manifolds, *Int. Math. Res. Not.*, **2022** (2022) 13181-13211.

- (with G. Uhlmann) Inverse problems for nonlinear hyperbolic equations, *Discrete Contin. Dyn. Syst.*, **41** (2021) 455-469.

- (with P. Li and Y. Zhao) Stability for the acoustic inverse source problem in inhomogeneous media, *SIAM J. Appl. Math.*, **80** (2020) 2547-2559.

- (with G. Uhlmann) On an inverse boundary value problem for a nonlinear elastic wave equation, *J. Math. Pures Appl.*, **153** (2021) 114-136.

- (with M. V. de Hoop, T. Saksala and G. Uhlmann) Generic uniqueness and stability for the mixed ray transform, *Trans. Amer. Math. Soc.*, **374** (2021) 6085-6144.

- (with M. V. de Hoop, A. Iantchcenko and R. D. van der Hilst) Semiclassical inverse spectral problem for seismic surface waves in isotropic media II: Rayleigh waves, *Inverse Problems*, **36** (2020) 075016.

- (with M. V. de Hoop, A. Iantchcenko and R. D. van der Hilst) Semiclassical inverse spectral problem for seismic surface waves in isotropic media I: Love waves, *Inverse Problems*, **36** (2020) 075015.

- (with X. Xu) Inversion of trace formulas for a Sturm-Liouville operator, *J. Comput. Math.*, **140** (2022) 398-416.

- (with M. V. de Hoop and G. Nakamura) Unique recovery of piecewise analytic density and stiffness tensor from the elastic-wave Dirichlet-to-Neumann map, *SIAM J. Appl. Math.*, **79** (2019) 2359-2384.

- (with M. V. de Hoop and G. Uhlmann) Inverting the local geodesic ray transform of higher rank tensors, *Inverse Problems*, **35** (2019) 115009.

- (with Y. Yang) Unique determination of a transversely isotropic perturbation in a linearized inverse boundary value problem for elasticity, *Inverse Probl. Imaging*, **13** (2019) 1309-1325.

- (with M. V. de Hoop and T. Saksala) Mixed ray transform on simple 2-dimensional Riemannian manifolds, *Proc. Amer. Math. Soc.*, **147** (2019) 4901-4913.

- (with M. V. de Hoop, A. Iantchenko, G. Nakamura) Semiclassical analysis of elastic surface waves, *preprint*, arXiv:1709.06521.

- (with M. V. de Hoop and G. Nakamura) Reconstruction of Lamé moduli and density at the boundary enabling directional elastic wavefield decomposition, *SIAM J. Appl. Math.*, **77** (2017) 520-536.

- (with E. Beretta, M. V. de Hoop, E. Francini and S. Vessella) Uniqueness and Lipschitz stability of an inverse boundary value problem for time-harmonic elastic waves, *Inverse Problems*, **33** (2017) 035013.

TEACHING

- Advanced Mathematics B I, Instructor, Fudan University, Fall 2023, 2024.

- Advanced Mathematics B II, Instructor, Fudan University, Spring 2023.

- Calculus II (MATH 1014), Instructor, HKUST, Spring 2020.

- Introduction to Differential Equations (MATH 307), Instructor, University of Washington, Winter 2019.

- Numerical analysis I (CAAM 453), Teaching Assistant, Rice University, Fall 2017.

AWARDS

- **Member of "Zhong Yang" Teaching Team**, Fudan University, 2023

- **Member of The Team for Merit Mentoring of Graduate Students**, Fudan University, 2023

- **Excellent Young Scholar**, The 12th Conference on Inverse Problems, Imaging and Applications, Shenzhen, China May 2023

- **Alan Weiser Memorial Travel Awards**, Rice University, CAAM May 2017

SELECTED PRESENTATIONS

- The 14th Conference on Inverse Problems, Imaging and Applications, Minisymposium on Theoretical inverse problems for elliptic and hyperbolic PDEs, Nankai University, Tianjian, China April 2025

- CMS Annual Meeting, Satellite Conference on computational mathematics, Jiaxing, China Nov. 2024

- Conference on Control, Inversion and Numerics for PDEs, Fudan University, China Oct. 2024

- SciCADE 2024, Minisymposium on Theory and Numerics of Inverse Problems, Singapore July 2024

- The 11th International Conference "Inverse Problems: Modeling and Simulation", Minisymposium on Microlocal Analysis and Waves: Progress and Challenges, Malta May 2024

- Differential Geometry and PDE Seminar, University of Washington, Seattle, WA, USA May 2024

- IAS workshop on Inverse Problems, Imaging and Partial Differential Equations, HKUST, Hong Kong, China   Dec. 2023

- ICIAM 2023 Tokyo, Minisymposium on Advances in Inverse Problems and Imaging, Tokyo, Japan   Aug. 2023

- Erlangen-Shanghai: Workshop on Control, Inversion and Numerics for PDEs   Aug. 2023

- The 12th Conference on Inverse Problems, Imaging and Applications, Southern University of Science and Technology, Shenzhen, China   May 2023

- CSIAM Annual Meeting, Minisymposium on Inverse Problems and Imaging, online   Nov. 2022

- Geometrical Inverse Problems, Linz, Austria   Nov. 2022

- Joint Workshop on Applied and Computational Mathematics, online   Nov. 2021

- Joint Fudan-RICAM Seminar on Inverse Problems, online   Dec. 2020

- Seminar, Northeast Normal University, online   Oct. 2020

- Seminar, Southern University of Science and Technology, online   Jun. 2020

- Minisymposium on Recent Advances in Geometric Inverse Problems, Applied Inverse Problems Conference, Grenoble, France   July 2019

- Minisymposium on Inverse Problems in Elastic Medium, Applied Inverse Problems Conference, Grenoble, France   July 2019

- Seminar, Zhejiang University, Hangzhou, China   Jun. 2019

- The 11th Conference on Inverse Problems, Imaging and Applications, Lanzhou University, Lanzhou, China   Jun. 2019

- The 5th East Asia Section of IPIA Young Scholars Symposium, Beijing, China   Jun. 2019

- Seminar, Hong Kong University of Science and Technology, Hong Kong, China   May. 2019

- Canadian Mathematical Society Winter Meeting, Vacouver, Canada   Dec. 2018

- Differential Geometry and PDE Seminar, University of Washington, Seattle, WA, USA   Oct. 2018

- International Workshop on Inverse Problems for PDEs, Nanjing, China   Sep. 2018

- SIAM Annual Meeting, Portland, OR, USA   July 2018

- Seminar, Zhejiang University, Hangzhou, China   Jun. 2017

- Applied Inverse Problem Conference, Hangzhou, China   Jun. 2017

- Graduate Seminar, Rice University, Houston, TX, USA   Feb. 2017

- IAS Workshop on Inverse Problems, Imaging and PDEs, HKUST, Hong Kong, China Dec. 2016

- Seminar, Fudan University, Shanghai, China   May 2016

- Graduate Seminar, Rice University, Houston, TX, USA   Nov. 2015

PROGRAMMING SKILLS

C/C++, Matlab