Hanwen Zhang

Contact Information

Department of Applied and Computational Mathematics
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Research Interests

Numerical analysis, fast algorithms, computational physics, PDE-constrained optimization

Employment

Gibbs Assistant Professor, Yale University	07/2022–
Graduate Research Assistant, Yale University	09/2017–05/2022
Optical Scientist, Facebook Reality Lab	06/2021–08/2021

Education

Ph.D., Applied Physics, Yale University	09/2017–05/2022
B.Sc., Physics, National University of Singapore	08/2012–05/2017
B.Eng., Material Science, National University of Singapore	08/2012–05/2017

Publications

1. **H Zhang**. "Constructing optimal Wannier functions via potential theory, Part II: isolated multiband for matrix models." (To be submitted.)
2. **H Zhang**. "A highly accurate procedure for computing globally optimal Wannier functions in one-dimensional crystalline insulators, Part II." (To be submitted.)
3. **H Zhang**. "Constructing optimal Wannier functions via potential theory: isolated single band for matrix models." *Preprint* (2025).
4. A. Gopal, **H Zhang**. "A highly accurate procedure for computing globally optimal Wannier functions in one-dimensional crystalline insulators." *Preprint* (2024).
5. **H. Zhang**, V. Rokhlin. "Finding roots of complex analytic functions via generalized colleague matrices." *Advances in Computational Mathematics* (2024).
6. W. Xue, **H. Zhang**, A. Gopal, V. Rokhlin, O. Miller. "Fullwave design of cm-scale cylindrical metasurfaces via fast direct solvers." *Preprint* (2023).
7. **H. Zhang**, Z. Kuang, S. Puri and O. Miller. "Conservation-law-based global bounds to quantum optimal control." *Physical Review Letters* (2021).
8. **H. Zhang**, O. Miller. "Quasinormal coupled mode theory." *Preprint* (2020).
9. **H. Zhang**, C.-W. Hsu, and O. Miller. "Scattering concentration bounds: brightness theorems for waves." *Optica* (2019).
10. Solutions manual to Quantum Mechanics by Julian Schwinger with Berthold-Georg Englert. (To appear.)

Talks

- *Constructing optimal Wannier functions via potential theory*, NYU Courant Institute of Mathematical Sciences (2025)
- *Constructing optimal Wannier functions via potential theory*, Flatiron Institute Center for Computational Mathematics (2025)
- *Finding scattering resonances via generalized colleague matrices*, SIAM Conference on Computational Science and Engineering (2025)
- *Finding scattering resonances via generalized colleague matrices*, UMass Lowell Mathematics & Statistics Colloquium (2024)

- *An efficient scheme for fullwave inverse design of large-scale metasurfaces*, SPIE (2022)
- *Conservation-law-based global bounds to quantum optimal control*, SUTD Mathematics and Technology Seminar (2021)
- *Brightness theorems for nanophotonics*, CLEO (2019)

Service and Outreach

- Organizer – Applied Mathematics Seminar, Yale University, 2023–present
- Reviewer – Applied and Computational Harmonic Analysis; Journal of Scientific Computing.

Teaching

Yale University, Department of Mathematics

- Instructor – MATH 325 Introduction to Functional Analysis, Spring 2026
- Instructor – MATH 325 Introduction to Functional Analysis, Spring 2025
- Instructor – MATH 246 Ordinary Differential Equations, Fall 2024
- Instructor – MATH 222 Linear Algebra with Applications, Spring 2024
- Instructor – MATH 246 Ordinary Differential Equations, Fall 2023
- Instructor – MATH 222 Linear Algebra with Applications, Spring 2023
- Instructor – MATH 222 Linear Algebra with Applications, Fall 2022

Yale University, Department of Physics

- Teaching assistant – PHYS 502 Electromagnetic Theory I, Spring 2019