Zhonggan Huang

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Research Interests

Homogenization theory, gradient flows, free boundary problems, geometric measure theory

Education

University of Utah — Salt Lake City, U.S.
PhD of Mathematics — 2021–Current

- Advisor: William M. Feldman
- Expected June, 2026

Southern University of Science and Technology — Shenzhen, China
Master of Mathematics — 2019–2021

- Thesis: "Topics on reaction-diffusion equations with large diffusion rate within thin components"
- Advisor: Xuefeng Wang

Southern University of Science and Technology — Shenzhen, China
Bachelor of Mathematics and Applied Mathematics — 2015–2019

- Thesis: "Review of the model about fast diffusion on a road in a large field using effective boundary conditions"
- Advisor: Xuefeng Wang

Preprints

1. **On the attainability of singular Wiener bound**, arXiv preprint arXiv: 2508.08208 (2025). Submitted to *SIAM Journal on Mathematical Analysis* in September 2025
2. **Homogenization of a vertical oscillating Neumann condition**, joint with William M Feldman, arXiv preprint arXiv: 2505.17298 (2025). Submitted to *Archive for Rational Mechanics and Analysis* in June 2025
3. **Regularity theory of a gradient degenerate Neumann problem**, joint with William M Feldman, arXiv preprint arXiv: 2406.06614 (2024). Submitted to *Journal de Mathématiques Pures et Appliquées* in September 2024

Publications

1. **Is Mean Curvature Flow a Gradient Flow?** arXiv preprint arXiv: 2212.03701 (2022). Accepted by *Proceedings of American Mathematical Society* (to appear)
2. **Homogenization of Enhancing Thin Layers,** Journal of Differential Equations, Volume 282, 2021, Pages 330-369, ISSN 0022-0396, https://doi.org/10.1016/j.jde.2021.02.024.

Invited Talks and Seminars

- **Talk in Analysis Seminar in WashU**
  at St. Louis, MO, November 3, 2025
  My Talk: Attainability of the singular Wiener bound and leaf venation patterns

  Website: https://math.wustl.edu/past-events/analysis-seminar-attainability-singular-wiener-bound-and-leaf-venation-patterns

- **AMS Special Session on Geometric Variational Problems and Applications**
  at St. Louis, MO, October 18-19, 2025
  My Talk: Attainability of the singular Wiener bound and leaf vein patterns
  Website: https://meetings.ams.org/math/fall2025c/meetingapp.cgi/Paper/52138
- **AMS Special Session on PDEs from Materials Science** at Hartford, Connecticut, April 5-6 2025
  My Talk: Semilinear homogenization and rate-independent motion law in a parabolic Neumann problem
  Website: https://meetings.ams.org/math/spring2025e/meetingapp.cgi/Paper/47927
- **Optimal Transport and Dynamics** at CMO, Oaxaca, August 11-16 2024
  My Talk: Regularity theory of a gradient degenerate Neumann problem
  Website: https://www.birs.ca/events/2024/5-day-workshops/24w5198
- **Large Deviation Principle and Optimal Transport** at University of Utah, 2022
  Reference material: Optimal Transport for Applied Mathematicians

Short Research Level Courses

- **PDE Summer School** at University of California, Irvine, June 23 - 27, 2025
  Website: https://ucipde2025.github.io/2025-PDE-Summer-School-Website/
- **RMMC Summer School** at University of Wyoming, Laramie, June 17-20, 2025
  Website: https://math.asu.edu/rmmcss2025
- **Frontiers in Applied Analysis** at Carnegie Mellon University, Pittsburgh, June 3-6, 2025
  Website: https://events.mcs.cmu.edu/frontiers2025/
- **Analysis and PDE** at Montana State University, Bozeman, May 14 to May 17, 2025
  Website: https://sites.google.com/view/apde-mt
- **Geometry of Measures and Free Boundaries** at UW Seattle, July 20-26 2024
  Website: https://sites.google.com/view/gmfbseattle2024/
- **Summer School on PDEs and Randomness** at Max Planck Institute, Leipzig, 2023
  Website: https://www.mis.mpg.de/calendar/conferences/2023/randompde.html
- **Summer Program in Partial Differential Equations** at UT Austin, 2022
  Website: https://analysispde.ma.utexas.edu/summer-program-in-partial-differential-equations-2022/
- **PIMS-IFDS-NSF Summer School on Optimal Transport** at UW Seattle, 2022
  Website: https://kantorovich.org/event/2022-optimal-transport-summer-school/
- **17-th Summer School on PDEs** at Jilin University, 2019
  Short Courses: fractional Laplacians, General Relativity, Special Lagrangian Equations

Teaching Experience

- Math 1050–006 College Algebra at University of Utah — Spring 2025
  Primary Instructor
- Math 1050–005 College Algebra at University of Utah — Spring 2024
  Primary Instructor
- Math 2250–014 & 015 Differential Equations and Linear Algebra at University of Utah — Fall 2022
  Lab Teacher
- Math 3140–005 & 006 Engineer Vector Calculus and PDE at University of Utah — Spring 2022
  Lab Teacher
- Math 1210–040 Calculus I at University of Utah — Fall 2021
  Lab Teacher
- Real Analysis at Southern University of Science and Technology — Fall 2019
  Teaching Assistant