

# Jinzi Mac Huang

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## Academic Positions

- 2020–Present **Assistant Professor of Mathematics**, New York University Shanghai.
- 2020–Present **Affiliated Assistant Professor of Mathematics**, Courant Institute, New York University.
- 2018–2020 **Postdoctoral Scholar**, Department of Physics, University of California San Diego.

## Education

- 2018 **PhD, Mathematics**, Courant Institute, New York University.
- 2013 **Bachelor of Science, Physics**, Zhiyuan College, Shanghai Jiao Tong University.

## Publications

### Preprints

- 2025 Yuejia Zhang, Nicholas J. Moore, and **Jinzi M Huang**. Reaction-diffusion equations describe heat transfer and flow structure in annular convection. *arXiv:2411.16488*, 2025.
- 2025 **Jinzi M Huang** and Nicholas J. Moore. A convective fluid pendulum revealing states of order and chaos. *arXiv:2307.13146*, 2025.

### Published Articles

- 2025 **Jinzi M Huang**. Covering convection with thermal blankets: fluid-structure interactions in thermal convection. *Journal of Fluid Mechanics*, volume 1003, 2025.
- 2024 **Jinzi M Huang** and Jun Zhang. Side-heated Rayleigh-Bénard convection. *Journal of Fluid Mechanics*, volume 999, 2024.
- 2024 **Jinzi M Huang**. Covering convection with a thermal blanket: numerical simulation and stochastic modelling. *Journal of Fluid Mechanics*, volume 980, 2024.
- 2024 Nicholas J. Moore and **Jinzi M Huang**. Large-scale circulation reversals explained by pendulum correspondence. *Journal of Fluid Mechanics*, volume 993, 2024.
- 2023 **Jinzi M Huang** and Jun Zhang. Rayleigh-Bénard thermal convection perturbed by a horizontal heat flux. *Journal of Fluid Mechanics*, volume 954, 2023.
- 2022 **Jinzi M Huang** and Nicholas J Moore. Morphological attractors in natural convective dissolution. *Physical Review Letters*, volume 128, 2022.
- 2022 Leif Ristroph, **Jinzi M Huang**, and Michael J Shelley. In pursuit of perfect pinnacles. *SIAM News*, 2022.
- 2021 **Jinzi M Huang**, Michael J Shelley, and David B Stein. A stable and accurate scheme for solving the Stefan problem coupled with natural convection using the Immersed Boundary Smooth Extension method. *Journal of Computational Physics*, volume 432, 2021.

- 2020 **Jinzi M Huang**, Joshua Tong, Michael Shelley, and Leif Ristroph. Ultra-sharp pinnacles sculpted by natural convective dissolution. *Proceedings of the National Academy of Sciences*, volume 117, 2020.
- 2020 Tanvi Gandhi, **Jinzi M Huang**, Antoine Aubret, Yaocheng Li, Sophie Ramanananarivo, Massimo Vergassola, and Jérémie Palacci. Decision-making at a T-junction by gradient-sensing microscopic agents. *Physical Review Fluids*, volume 5, 2020.
- 2019 Khunsa Amin, **Jinzi M Huang**, Kevin J Hu, Jun Zhang, and Leif Ristroph. The role of shape-dependent flight stability in the origin of oriented meteorites. *Proceedings of the National Academy of Sciences*, volume 116, 2019.
- 2018 Megan S Davies Wykes, **Jinzi M Huang**, George A Hajjar, and Leif Ristroph. Self-sculpting of a dissolvable body due to gravitational convection. *Physical Review Fluids*, volume 3, 2018.
- 2018 **Jinzi M Huang**, Jin-Qiang Zhong, Jun Zhang, and Laurent Mertz. Stochastic dynamics of fluid–structure interaction in turbulent thermal convection. *Journal of Fluid Mechanics*, volume 854, 2018.
- 2015 **Jinzi M Huang**, M Nicholas J Moore, and Leif Ristroph. Shape dynamics and scaling laws for a body dissolving in fluid flow. *Journal of Fluid Mechanics*, volume 765, 2015.

## Teaching

- Spring 2025 **Numerical Analysis**, *MATH-SHU 252*, NYU Shanghai.
- Fall 2024 **Intro to Math Modeling\***, *MATH-SHU 251*, NYU Shanghai.
- Spring 2024 **Numerical Analysis**, *MATH-SHU 252*, NYU Shanghai.
- Fall 2023 **Intro to Math Modeling\***, *MATH-SHU 251*, NYU Shanghai.
- Fall 2022 **Intro to Math Modeling\***, *MATH-SHU 251*, NYU Shanghai.
- Spring 2022 **Partial Differential Equations**, *MATH-SHU 263*, NYU Shanghai.
- Fall 2021 **Intro to Math Modeling\***, *MATH-SHU 251*, NYU Shanghai.
- Spring 2021 **Calculus**, *MATH-SHU 131*, NYU Shanghai.
- Fall 2020 **Intro to Math Modeling**, *MATH-SHU 251*, NYU Shanghai.

\* **Outstanding Undergraduate Courses of Shanghai Municipality**, 上海市一流本科课程.

## Talks

### Invited Talks

- 2025 **Natural convection and moving boundary problems**, *University of North Carolina Applied Math Colloquium*, Chapel Hill, USA, 01/2025.
- 2025 **Modelling geophysical fluid-structure interactions**, *University of North Carolina EMES Seminar*, Chapel Hill, USA, 01/2025.
- 2024 **Morphological attractors in natural convective dissolution**, *SIAM Conference on Nonlinear Waves and Coherent Structures*, Baltimore, USA, 06/2024.
- 2023 **Understand and control the large-scale circulation of thermal convection**, *Department of Mathematics Colloquia*, City University of Hong Kong, Hong Kong, China, 11/2023.
- 2023 **A simple model on what drives continental drifts**, *10th International Congress on Industrial and Applied Mathematics*, Tokyo, Japan, 08/2023.

- 2023 **Controlling turbulent Rayleigh Bénard convection with horizontal heat flux**, *CSTAM 2023 Annual Meeting of Turbulence and Flow Instabilities*, Ningbo, China, 04/2023.
- 2023 **Convection and dissolution induced geomorphologies**, *Department of Mechanical Engineering and Materials Science Seminar*, Yale University, New Haven, USA, 01/2023.
- 2022 **Morphological attractors in natural convective dissolution**, *Pudong Forum of Fluid Physics*, Shanghai, China, 05/2022.
- 2022 **Solid-fluid coupled melting and dissolution dynamics shaped landscape evolution**, *APS March Meeting*, Chicago, USA, 03/2022.
- 2022 **Dissolution induced geomorphologies**, *LadHyX Seminar*, École Polytechnique, France, 01/2022.
- 2021 **Laboratory study of dissolution induced geomorphologies**, *LOMA Seminar*, Université de Bordeaux/CNRS, France, 12/2021.
- 2021 **Heat and mass transfer in nature**, *Aeronautics and Astronautics Seminar*, Fudan University, Shanghai, China, 11/2021.
- 2021 **Tricks in applied math**, *Veritas Lectures*, Shanghai, China, 07/2021.
- 2021 **Geophysical fluid-structure interactions**, *Young Scholar Forum*, East China Normal University, Shanghai, China, 06/2021.
- 2021 **Heat and mass transfer through fluid-structure interactions**, *Institute Faculty Talk*, New York University Shanghai, Shanghai, China, 05/2021.
- 2021 **Heat and mass transfer through fluid-structure interactions**, *Institute of Fluid Mechanics Seminar*, Tsinghua University, Beijing, China, 04/2021.
- 2021 **Heat and mass transfer through fluid-structure interactions**, *Key Laboratory of Fluid Mechanics Seminar*, Beihang University, Beijing, China, 04/2021.
- 2021 **Heat and mass transfer through fluid-structure interactions**, *COE Seminar*, Peking University, Beijing, China, 04/2021.
- 2021 **Heat and mass transfer through fluid-structure interactions**, *Department of Mechanics and Aerospace Engineering Seminar*, Southern University of Science and Technology, Shenzhen, China, 04/2021.
- 2021 **Fluid-structure interactions in geophysics**, *Shi Group Seminar*, East China Normal University, Shanghai, China, 01/2021.
- 2020 **Mass transfer through fluid-structure interactions**, *INS Joint Seminar*, Shanghai Jiao Tong University, Shanghai, China, 11/2020.
- 2020 **Experimental and numerical study of Stefan problems in dissolution and melting**, *Fluid Dynamics Forum for Young Scholars*, Online, 11/2020.
- 2020 **Math in the lab: mass transfer through fluid-structure interactions**, *Mathematics Colloquium*, University of Wisconsin, Madison, WI, 02/2020.
- 2020 **Math in the lab: mass transfer through fluid-structure interactions**, *Special Colloquium*, Courant Institute, New York, NY, 02/2020.
- 2020 **Math in the lab: mass transfer through fluid-structure interactions**, *Mathematics Colloquium*, Tulane University, New Orleans, LA, 01/2020.
- 2018 **Heat and mass transfer in geophysical fluid-structure interactions**, *Fluid Mechanics Seminars*, UCSD, San Diego, CA, 11/2018.

- 2018 **The reappearance of geological patterns in lab scale experiments**, *INS Seminar*, Shanghai Jiao Tong University, Shanghai, China, 05/2018.
- 2017 **Sculpting of a dissolving body**, *ACMS Seminar*, University of Wisconsin Madison, Madison, WI, 09/2017.
- 2017 **Visible candy and invisible flow**, *Pineapple Awards Symposium*, Zhejiang Science and Technology Museum, Hangzhou, China, 04/2017.
- 2017 **Sculpting of a dissolving body**, *SIAM CSE Meeting*, Atlanta, GA, 03/2017.
- 2017 **Sculpting of a dissolvable body through natural and forced solutal convection**, *GFDI Seminar*, Florida State University, Tallahassee, FL, 03/2017.
- 2016 **Heat and mass transfer through fluids**, *Math Analysis/PDE Seminar*, NYU Shanghai, Shanghai, China, 03/2016.

#### Contributed Talks

- 2024 **How ideal is the Hele-Shaw flow**, *APS DFD Annual Meeting*, Salt Lake City, UT, 11/2024.
- 2023 **Rayleigh-Bénard thermal convection perturbed by a horizontal heat flux**, *APS DFD Annual Meeting*, Washington, D.C., 11/2023.
- 2023 **Fluid pendulum explains reversals of the large-scale circulation in thermal convection**, *9th International Conference on Rayleigh Bénard Turbulence*, Xi'an, China, 10/2023.
- 2022 **A toy model of plate tectonics**, *APS DFD Annual Meeting*, Indianapolis, IN, 11/2022.
- 2019 **Navigating through complex networks by sniffing gradients: diffusiophoresis vs. chemotaxis**, *APS DFD Annual Meeting*, Seattle, WA, 11/2019.
- 2019 **Solving coupled Stefan-flow problems using Immersed Boundary Smooth Extension**, *SO-CAMS 2019*, Caltech, Pasadena, CA, 04/2019.
- 2018 **Solving coupled Stefan-flow problems using Immersed Boundary Smooth Extension**, *APS DFD Annual Meeting*, Atlanta, GA, 11/2018.
- 2018 **Solute transport by flow yields geometric shocks in shape evolution**, *APS DFD Annual Meeting*, Atlanta, GA, 11/2018.
- 2018 **Solute transport by flow yields geometric shocks in shape evolution**, *SIAM SEAS Meeting*, Charlotte, NC, 04/2018.
- 2018 **Solute transport by flow yields geometric shocks in shape evolution**, *AMD, RPI*, Troy, NY, 03/2018.
- 2017 **Solute transport by flow yields geometric shocks in shape evolution**, *APS DFD Annual Meeting*, Denver, CO, 11/2017.
- 2017 **Rayleigh-Bénard convection with side wall heating**, *APS DFD Annual Meeting*, Denver, CO, 11/2017.
- 2016 **3D shadowgraph technique visualizes thermal convection**, *APS DFD Annual Meeting*, Portland, OR, 11/2016.
- 2014 **Sculpting of a dissolvable body by flowing water**, *APS DFD Annual Meeting*, San Francisco, CA, 11/2014.