# Junyan Zhang


CONTACT INFORMATION

Johns Hopkins University
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EDUCATION

**Johns Hopkins University**

Ph.D. Candidate, Mathematics, Aug 2017-(expected) May 2022.

- Thesis Title(expected): Free-boundary problems in magnetohydrodynamics.
- Advisor: Professor Hans Lindblad.

**University of Science and Technology of China (USTC)**

B. Sc. in Mathematics, August 2013-June 2017.

- Undergraduate Thesis: Inviscid dampimg and Asymptotic Stability of PDEs in fluids.
- Advisor: Professor Lifeng Zhao.

RESEARCH INTERESTS

PDEs of fluids. My current research focuses on the free-boundary problems in inviscid fluids (mostly compressible, with or without surface tension), e.g. water wave, relativistic fluids, MHD, elastodynamics, liquid crystal, etc. I'm also interested in the multi-dimensional shocks, singularity formation, and long time existence (or stability of certain equilibria solutions) of compressible fluids.

PUBLICATIONS & PREPRINTS

1. Chenyun Luo, Junyan Zhang. *Local Well-posedness for the Motion of a Compressible Gravity-Capillary Water Wave with Vorticity.* In preparation.
2. Xumin Gu, Chenyun Luo, Junyan Zhang. *Zero Surface Tension Limit of the Free-Boundary Incompressible Magnetodynamic Equations.* In preparation.
3. Hans Lindblad, Junyan Zhang. *Anisotropic Regularity of the Free-Boundary Problem in Compressible Ideal Magnetohydrodynamics.* arxiv: 2106.12173 preprint.
4. Xumin Gu, Chenyun Luo, Junyan Zhang. *Local Well-posedness of the Free-Boundary Incompressible Magnetohydrodynamics with Surface Tension.* arxiv: 2105.00596 preprint.
5. Junyan Zhang. *Local Well-posedness and Incompressible Limit of the Free-Boundary Problem in Compressible Elastodynamics.* arxiv: 2102.07979 preprint.
6. Junyan Zhang. *Local Well-posedness of the Free-Boundary Problem in Compressible Resistive Magnetohydrodynamics.* arxiv: 2012.13931 preprint.
7. Chenyun Luo, Junyan Zhang. *Local Well-posedness for the Motion of a Compressible Gravity Water Wave with Vorticity.* arxiv: 2109.02822 preprint, first submitted on April 12, 2020.
8. Junyan Zhang. *A priori Estimates for the Free-Boundary problem of Compressible Resistive MHD Equations and Incompressible Limit.* arxiv: 1911.04928

preprint.

9. Chenyun Luo, Junyan Zhang. *A priori Estimates for the Incompressible Free-Boundary Magnetohydrodynamics Equations with Surface Tension.* **SIAM Journal on Mathematical Analysis, 53(2), 2595-2630 (2021)**.
10. Chenyun Luo, Junyan Zhang. *A Regularity Result for the Incompressible Magnetohydrodynamics Equations with Free Surface Boundary.* **Nonlinearity, 33(4), 1499-1527 (2020)**.

## Referee Experience

- Archive for Rational Mechanics and Analysis (2 papers)
- Nonlinearity (1 paper)

## Talks & Seminars

- *Local well-posedness and incompressible limit of free-boundary compressible elastodynamics*, Webinar on APDE, June 5 2021.
- *Local well-posedness and incompressible limit of the free-boundary compressible resistive MHD equations*, Wuhan University, Jan 10 2021.
- *Local well-posedness for the motion of compressible gravity water wave*, University of Science and Technology of China, Nov 6 2020.
- *On the free-boundary problem of MHD equations with or without surface tension*, University of Science and Technology of China, Dec 23 2019.
- *On the Incompressible MHD with or without Surface Tension*, Institute of Mathematics, Chinese Academy of Sciences, May 23 2019.

## Conferences & Workshops Attended

- *Mathematics of Fluid Dynamics program*, UC Berkeley MSRI, Jan-May 2021 (online due to the COVID-19 pandemic).
- *Long Time Behavior and Singularity Formation in PDEs*, New York University Abu Dhabi, May 2020 and Dec 2020 (online due to the COVID-19 pandemic).
- *2019 Southern California Analysis and PDE Conference*, UCSD, November 2019.
- *Summer School on Mathematical General Relativity and the Geometric Analysis of Waves of Fluids*, MIT, June 2018.

## Teaching Experience

**Johns Hopkins University**

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| 2021 Fall | Teaching assistant, Introduction to Proofs |
| | Grader, Graduate Real Analysis |
| 2020 Fall | Teaching assistant, Honor Analysis I |
| | Teaching assistant, Ordinary Differential Equations |
| 2020 Spring | Teaching assistant, Honor Analysis II |
| | Grader, Undergraduate PDEs |
| 2019 Fall | Teaching assistant, Honor Analysis I |
| | Grader, Graduate Real Analysis |
| 2019 Spring | Teaching assistant, Honor Analysis II |
| | Teaching assistant, Calculus II (Engineering) |
| 2018 Fall | Teaching assistant, Calculus II (Engineering) |
| 2018 Spring | Grader, Undergraduate PDEs |
| 2017 Fall | Grader, Undergradute Complex Analysis, Calculus I (Engineering) |

**University of Science and Technology of China**

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|---|---|
| 2017 Spring | Teaching assistant, Differential Equations II (Graduate PDE) |
| 2016 Fall | Teaching assistant, Advanced Real Analysis (Graduate) |
| 2016 Spring | Teaching assistant, Honor Real Analysis |

## Honors and Awards

**Johns Hopkins University**

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| 2021 | Professor Joel Dean Excellence in Teaching Award for TAs. |
| 2017-Now | Full tuition fellowship and Teaching assistantship. |

**University of Science and Technology of China**

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| 2017 | Outstanding Undergraduates |
| 2016, 2017 | Outstanding Teaching Assistant |
| 2016 | Huang Yu Honored Scholarship |
| 2015 | First Prize in The Chinese Mathematics Competitions |
| | Zhang Zong-zhi Sci-Tech Scholarship |
| 2013, 2014 | Silver Prize, Outstanding Freshmen/Undergraduates Scholarship |

## Citizenship

Chinese (The People's Republic of China).

## Relevant Skills

Languages: Chinese(native), English(fluent)

## References

- **Hans Lindblad**, Professor of Department of Mathematics, Johns Hopkins University.
  Email: `lindblad@math.jhu.edu`
- **Zhouping Xin**, Executive Director & William M. W. Mong Professor of Mathematics, The Institute of Mathematical Sciences, The Chinese University of Hong Kong.
  Email: `zpxin@ims.cuhk.edu.hk`
- **Chenyun Luo**, Assistant Professor of Department of Mathematics, The Chinese University of Hong Kong.
  Email: `cluo@math.cuhk.edu.hk`
- **Richard Brown**, Director of Undergraduate Studies and Teaching Professor of Department of Mathematics, Johns Hopkins University.
  Email: `richardbrown@jhu.edu`