

# Junyan Zhang

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## CONTACT INFORMATION

Johns Hopkins University  
Department of Mathematics  
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## EDUCATION

### Johns Hopkins University

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

- Thesis Title: 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.

- Undergrad Thesis: Inviscid damping 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, and complex fluids such as MHD, elastodynamics, liquid crystal. I'm also interested in the long time behaviour, the singularity and shock formation of compressible fluids.

## PUBLICATIONS & PREPRINTS

1. Xumin Gu, Chenyun Luo, Junyan Zhang. *Local Well-posedness of the Free-Boundary Incompressible Magnetohydrodynamics with Surface Tension*. [arxiv: 2105.00596](#) preprint.
2. Junyan Zhang. *Local Well-posedness and Incompressible Limit of the Free-Boundary Problem in Compressible Elastodynamics*. [arxiv: 2102.07979](#) preprint.
3. Junyan Zhang. *Local Well-posedness of the Free-Boundary Problem in Compressible Resistive Magnetohydrodynamics*. [arxiv: 2012.13931](#) preprint.
4. Chenyun Luo, Junyan Zhang. *Local Well-posedness for the Motion of a Compressible Gravity Water Wave with Vorticity*. Preprint, submitted on April 12, 2020.
5. Junyan Zhang. *A priori Estimates for the Free-Boundary problem of Compressible Resistive MHD Equations and Incompressible Limit*. [arxiv: 1911.04928](#) preprint.
6. 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).

7. 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 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**

|             |   |
|-------------|---|
| 2020 Fall   | Teaching assistant, Honor Analysis I<br>Teaching assistant, Ordinary Differential Equations |
| 2020 Spring | Teaching assistant, Honor Analysis II<br>Grader, Undergraduate PDEs                         |
| 2019 Fall   | Teaching assistant, Honor Analysis I<br>Grader, Graduate Real Analysis                      |
| 2019 Spring | Teaching assistant, Honor Analysis II<br>Teaching assistant, Calculus II (Engineering)      |
| 2018 Fall   | Teaching assistant, Calculus II (Engineering)   |
| 2018 Spring | Grader, Undergraduate PDEs  |
| 2017 Fall   | Grader, Undergraduate 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**

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**

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
- ❑ **Chenyun Luo**, NTT Assistant Professor of Department of Mathematics, Vanderbilt University. Assistant Professor at Chinese University of Hong Kong (CUHK).  
Email: chenyun.luo@vanderbilt.edu