

Rundong Zhou

Curriculum Vitae

Contact Information

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Research Interests

Ocean turbulence, Geophysical fluid dynamics • Statistical physics, Nonlinear dynamics • Computational mathematics, Spectral methods

EDUCATION

Candidate for **Master of Science**

expected June 2024

Chalmers University of Technology

Gothenburg, Sweden

Joint with the **University of Gothenburg, Department of Physics**

cGPA 4.75/5

Major in Complex Adaptive Systems

Erasmus+ Exchange Program

August 2023 - June 2024

University of Twente

Enschede, The Netherlands

Placement in the **Physics of Fluids group**

Master's thesis supervisor: Dr. Christopher J. Howland and Prof. Detlef Lohse

Bachelor of Applied Science in Engineering Science

June 2021

University of Toronto

Toronto, Canada

Major in Engineering Physics

cGPA 3.28/4

Bachelor's thesis supervisor: Prof. Nicolas Grisouard

LIST OF PUBLICATION

Zhou, R. and Grisouard, N. *Spectral solver for Cauchy problems in polar coordinates using discrete Hankel transforms*. Preprint, 2023. [arXiv:2210.09736](https://arxiv.org/abs/2210.09736)

HONOURS AND AWARDS

Avancez Scholarship

2022 - 2024

Chalmers University of Technology

75% tuition fee reduction, increased to 85% reduction in the second year for excellency.

Erasmus+ Exchange Travel Grant

2023 - 2024

Chalmers University of Technology & University of Twente

€5,500 travel grant in total.

Undergraduate Research Fellowship

2018

Canadian Institute for Theoretical Astrophysics

CAD \$2,000 per month for four months.

Dean's Honor List

2015 Fall, 2016 Fall

University of Toronto

2020 Fall, 2021 Winter

Pass with honor, >80% average.

RESEARCH EXPERIENCE

Master's Thesis

June 2023 - June 2024

Physics of Fluids group, University of Twente

Enschede, The Netherlands

Supervisor: Dr. Christopher J. Howland and Prof. Detlef Lohse

Swirling Kolmogorov flow, modelling ocean turbulent mixing driven by near-inertial waves. Performing instability analysis and direct numerical simulation using Dedalus spectral PDE solver library on supercomputers. Understanding the fundamental physical process and the fluid structures of the flow via turbulence theory, statistical mechanics, and dynamical systems approaches.

Bachelor's Thesis**Division of Engineering Science, University of Toronto***Supervisor:* Prof. Nicolas Grisouard

September 2020 - April 2021

Toronto, Canada

Developing a novel spectral method for solving the Gross-Pitaevskii equation for Bose-Einstein condensates in polar coordinates. Improving the accuracy of the method and experimenting the method on annulus domains. Experience with computational physics.

Research Assistant¹**Department of Physics, University of Toronto***Supervisor:* Prof. Nicolas Grisouard

April 2021 - October 2022

Applying the novel Fourier-Bessel based spectral method using the discrete Hankel transform to various kinds of PDEs under Dirichlet boundary conditions in polar coordinates. Analyzing the boundary-dependent convergence rate of the method and validating the error estimation. Experience with numerical analysis and spectral theorems.

Research Assistant**Department of Mechanical Engineering, University of Ottawa***Supervisor:* Prof. Natalie Baddour

January - April 2022

Developing a new type of 2-D discrete Fourier transform under Neumann boundary conditions in polar coordinates using Dini series. Validating the discrete orthogonality relation with Hankel-Schl fli integral. Experiences with complex analysis.

Summer Undergraduate Research Program**Canadian Institute for Theoretical Astrophysics**

Experience with data analysis on Galactic Legacy Infrared Midplane Survey Extraordinaire (GLIMPSE) database.

May - September 2018

Toronto, Canada

Summer Schools & Other Experiences**Summer School in Mathematics****Universit  Grenoble Alpes, Institut Fourier**

Topics in new trends in mathematical fluid mechanics: Mathematical analysis of incompressible fluid flow, Geophysical flows, Theory of water waves, Singular solutions of the Euler or Navier-Stokes equations, etc.

June 2023

Grenoble, France

Featured Courses

Toronto: Continuum Mechanics, Computational Physics, Nonlinear Physics, Statistical Mechanics, Groups and Symmetries

Chalmers: Dynamical Systems, Non-equilibrium Processes in Physics Chemistry and Biology, Quantum Field Theory, Artificial Neural Networks

Twente: Advanced Fluid Mechanics, Turbulence, Functional Analysis, Granular Matter, Physics of Bubbles, Fluids and Elasticity

Programming Skills

Experienced: *Languages:* Python, Matlab, L  T  X, Mathematica

Libraries: Dedalus, NumPy, Matplotlib, SciPy

Familiar: *Languages:* C, JavaScript, HTML

Libraries: HDF5, Pandas

Latest Update: October 1, 2023

¹As the continuation of the bachelor's thesis.