

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**

Chalmers University of Technology

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

Major in Complex Adaptive Systems

expected June 2024

Gothenburg, Sweden

cGPA 4.75/5

Erasmus+ Exchange Program

University of Twente

Placement in the **Physics of Fluids group**

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

August 2023 - June 2024

Enschede, Netherlands

cGPA 8.25/10

Bachelor of Applied Science in Engineering Science

University of Toronto

Major in Engineering Physics

Bachelor's thesis supervisor: Prof. Nicolas Grisouard

June 2021

Toronto, Canada

cGPA 3.28/4

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

Chalmers University of Technology

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

2022 - 2024

Erasmus+ Exchange Travel Grant

Chalmers University of Technology & University of Twente

€5,500 travel grant in total.

2023 - 2024

Undergraduate Research Fellowship

Canadian Institute for Theoretical Astrophysics

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

2018

Dean's Honor List

University of Toronto

Pass with honor, >80% average.

2015 Fall, 2016 Fall

2020 Fall, 2021 Winter

RESEARCH EXPERIENCE

Master's Thesis

Physics of Fluids group, University of Twente

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

June 2023 - June 2024

Enschede, Netherlands

Swirling Kolmogorov flow, modelling ocean turbulent mixing driven by near-inertial waves. Performing instability analysis and direct numerical simulation using Dedalus (Python) and GHOST (Fortran) spectral PDE solver libraries on supercomputers. Understanding the fundamental physical processes, mixing of passive scalar, the energy-helicity cascades, and the fluid structures of the flow via turbulence theory, statistical mechanics, and dynamical systems approaches.

Bachelor's Thesis

September 2020 - April 2021

Division of Engineering Science, University of Toronto

Toronto, Canada

Supervisor: Prof. Nicolas Grisouard

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

April 2021 - October 2022

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

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

January - April 2022

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

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

May - September 2018

Canadian Institute for Theoretical Astrophysics

Toronto, Canada

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

Summer Schools & Other Experiences**Summer School in Mathematics**

June 2023

Universit  Grenoble Alpes, Institut Fourier

Grenoble, France

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.

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, Mathematical and Numerical Physics

Programming Skills

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

Libraries: Dedalus, NumPy, Matplotlib, SciPy

Familiar: *Languages:* C, Fortran, JavaScript, HTML

Libraries: HDF5, Pandas

Latest Update: February 23, 2024

¹As the continuation of the bachelor's thesis.