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

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. Howlan 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 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 Assistant[1] 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-Schläfli 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
Université 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, Granular Matter, Physics of Bubbles, Fluids and Elasticity

Programming Skills

Experienced: *Languages:* Python, Matlab, LaTeX, Mathematica
Libraries: Dedalus, NumPy, Matplotlib, SciPy
Familiar: *Languages:* C, JavaScript, HTML
Libraries: HDF5, Pandas

Latest Update: October 1, 2023

[1] As the continuation of the bachelor's thesis.