Academic Curriculum Vitae

Timothy Charles Andrews

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Place of Birth: Croydon, England
Nationality: Dual citizen of New Zealand and the United Kingdom
New Zealand Permanent Residence: 28 Plympton St, New Plymouth, 4310
United States Current Residence: 1105 Nielsen Court, Apt 6, Ann Arbor, Michigan, 48105
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Research Interests

- Numerical modelling of geophysical fluid equations
- Development and testing of dynamical cores for Global Circulation Models (GCMs)
- Analysis of timestepping methods
- Phase-averaged timestepping in oscillatory PDEs
- Parallel-in-time methods

Education

Doctor of Philosophy (PhD) in Mathematics (Geophysical and Astrophysical Fluid Dynamics) — University of Exeter (2020–2024)
Bachelor of Engineering with First Class Honours, specialising in Engineering Science — University of Auckland (2016–2019)

Conferences and Presentations

- Oral presentation at PinT 2023 conference (Hamburg, Germany)
- Oral presentation at the 2023 'PDEs on the Sphere' conference (Grenoble, France)
- Poster presentation at EGU 2023 (Vienna, Austria)
- Visiting seminar at NIWA in 2023 (Wellington, New Zealand)
- Attended the Firedrake 2022 and 2023 conferences (United Kingdom)
- CBMS Conference – Parallel Time Integration at Michigan Tech in 2022, with lectures from Martin Gander
- Poster presentation at the 2022 conference 'Solvers for frequency-domain wave problems and applications'(Glasgow, United Kingdom)

Publications

- PhD Thesis: Andrews, T. (2024). Using nonlinear interactions to quantify and improve timestepping accuracy in the Rotating Shallow Water Equations.
- Andrews, T. C., Wingate, B. A. (2024). A mean correction for improved phase-averaging accuracy in oscillatory, multiscale, differential equations. arXiv preprint arXiv:2404.03964.
- Andrews, T., Shipton, J., Wingate, B. (2023). The effect of linear dispersive errors on nonlinear time-stepping accuracy. arXiv preprint arXiv:2305.06685.
- Andrews, T., Wingate, B., Shipton, J. (2023, May). Quantifying the accuracy of large time-steps in highly oscillatory systems. In EGU General Assembly Conference Abstracts (pp. EGU-14086).

Other Research Experience

- A code developer for the Gusto, a compatible finite element library for solving the geophysical fluid equations (`https://www.firedrakeproject.org/gusto`).
- Connections with the UK Met Office, including using the new LFRic model for some results in my PhD thesis. I have contributed some code to the trunk of LFRic's shallow water mini app.
- Collaborations with Alex Pletzer at NIWA (New Zealand) around mimetic vector interpolation for LFRic, including comparing different Jacobian approximations.
- An ongoing collaboration with Tom Bendall (Met Office) on conservative tracer transport with compatible finite elements in Gusto.
- I can use the programming languages of Python, Fortran, MATLAB, R, and Visual Basic.
- Summer Internship research project at the Methanex New Zealand plant in Taranaki. This focused on using extreme value statistics to extrapolate the states of the plant's processing devices, given a small testing sample (2018-2019).
- Summer Research Scholarship project in the Precision Acoustic Group, within the University of Auckland Physics Department. I investigated using reflected acoustic measurements to estimate soil moisture properties (2017-2018).

Academic Achievements

During my bachelor's degree in Engineering Science:

2019

First in Course Awards for:
ENGSCI 711: Advanced Mathematical Modelling
ENGSCI 740: Advanced Mechanics in Research and Technology
ELECTENG 733: Signal Processing

2018

First in Course Awards for:
ENGSCI 314: Mathematical Modelling 3
ENGSCI 343: Mathematical and Computational Modelling in Mechanics
ENGSCI 344: Modelling and Simulation in Computational Mechanics
ENGSCI 391: Optimisation in Operations Research
MECHENG 325: Dynamics of Fluids and Structures

2017

First in Course Awards for:
ENGSCI 233: Computational Techniques and Computer Systems
ENGSCI 255: Modelling in Operations Research

2016 – 2018

Named on the University of Auckland Dean's Honours List for Top Engineering Students of the Year

Last year of High School:

2015
Dux of New Plymouth Boys' High School (NPBHS)
NZQA Scholarships attained in Physics, Statistics, and Economics
Awarded an IPENZ Foundation Scholarship to study Engineering

Teaching

- Teaching assistant for NSC1002 Mathematics and Computing at the University of Exeter (2022).
- High School maths and physics tutoring for Taranaki Tutors, New Plymouth, New Zealand (2020–2022).

Other Achievements

- Ran the Wanganui marathon (42km) in under three and a half hours (2019)
- Have completed four half marathon runs
- Completed the 'Lake Taupo Cycle Challenge' (Approx. 160km) (2018)
- Member of the Auckland University Division 1 Men's hockey team (2016-2017)
- Member of the 1st XI NPBHS Hockey team (2013-2015)
- Member of the NPBHS Senior Debating Team (2015)

Hobbies

I am passionate about outdoor activities such as hiking (we call it tramping in New Zealand!) and running. I love planning and executing multiple-day adventures in the forest parks of New Zealand. I am also aiming to complete the New Zealand Coast to Coast challenge sometime. In my spare time, when I'm not enjoying nature, I relax by cooking and reading epic fantasy books.

Academic Referees

Professor Beth Wingate - Mathematics Department at the University of Exeter
PhD supervisor
b.wingate@exeter.ac.uk

Dr Jemma Shipton - Mathematics Department at the University of Exeter
PhD second supervisor
J.Shipton@exeter.ac.uk