Boris Andrews

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EDUCATION

2021 – 2025 (predicted) — **University of Oxford**, *PhD (DPhil) in Mathematics (Numerical Analysis)*
- Thesis: Structure-preserving finite-element methods via auxiliary variables: conservative and accurately dissipative integrators, and energy estimates for inhomogeneous boundary-value problems
- Supervisors: Patrick Farrell, Wayne Arter

2017 – 2021 — **University of Oxford**, *Integrated Masters in Mathematics (MMath)*, First (Distinction)
- Thesis: Computation and approximation properties of near orthogonal matrices for tall random matrices
- Supervisor: Yuji Nakatsukasa

RESEARCH INTERESTS

Structure-preserving numerical methods for PDEs/ODEs, *Conservation and dissipation structures/Global & local energy estimates*

Finite element theory, *Finite element exterior calculus/Domain decomposition/Parallel in time*

Hybrid fluid-particle models, *Plasma modelling*

Turbulent systems, *Stabilisation/Preconditioning*

PUBLICATIONS & PREPRINTS

Preprints — **High-order conservative and accurately dissipative numerical integrators via auxiliary variables**, *with Patrick Farrell*, 16 July 2024
- Submitted to Foundations of Computational Mathematics

Upcoming *(Draft on request)* — **High-order structure-preserving discretisation for ideal MHD arising in the Parker problem**, *with Mingdong He, Kaibo Hu, Patrick Farrell*

High-order conservative–dissipative integrators for reversible–irreversible systems

Upcoming *(Draft on request)* — **An augmented Lagrangian preconditioner for natural convection at high Reynolds number**, *with Alexei Gazca, Patrick Farrell, Benjamin Castellaz*

Structure-preserving finite-elements methods for inhomogeneous boundary-value problems via auxiliary variables

High-order asymptotic-preserving integrators for charged particles in arbitrary magnetic fields

Upcoming — **Conservative integrators exhibit greater stability than symplectic integrators on the Toda lattice**, *with Sebastian Ohlig, Patrick Farrell*

PROFESSIONAL EXPERIENCE

Aug – Oct 2024 — **Tokamak Energy**, *Internship*, Physics: theory and modelling

Jul – Aug   **Perm State University**, *Internship,* Computational fluid dynamics
2019

Teaching Experience

2024 – 2025   **Tutor**, *University of Oxford*, Computational Mathematics

2023 – 2024   **Tutor**, *University of Oxford*, Prelims corner

                Teaching assistant, *University of Oxford*, Numerical Linear Algebra

2021 – 2022   **Teaching assistant**, *University of Oxford*, Random Matrix Theory

                Stipendiary lecturer, *Oriel College, University of Oxford*, Analysis I

Prizes, Awards and Scholarships

2021 – 2025   **DPhil studentship**, *Engineering and Physical Sciences Research Council (EPSRC)*

                DPhil studentship, *United Kingdom Atomic Energy Authority (UKAEA)*

2017 – 2021   **Foundation scholarship**, *Worcester College, University of Oxford*

                Collection prizes, *Worcester College, University of Oxford*

Seminar, Workshop and Conference Presentations

(*scheduled/provisional)

2025   **SIAM DS25*** *(Denver, Colorado)* | **Invited talk*** *(Brown University)* | **Firedrake User Meeting USA 2025*** *(Fort Worth, Texas)* | **Numerical Mathematics & Scientific Computing seminar*** *(Rice University)*

2024   **Internal seminar*** *(Rice University)* | **Computing Division technical meeting** *(UKAEA)* | **Firedrake User Meeting 2024** *(University of Oxford)* | **PDEsoft** *(University of Cambridge)* | **European Finite Element Fair** *(University College London)* | **Exploiting Algebraic and Geometric Structure in Time-integration Methods workshop** *(University of Pisa)* | **UKAEA PhD student engagement day** *(UKAEA)* | **Junior Applied Mathematical Seminar** *(University of Warwick)*

2023   **ICIAM 2023** *(Waseda University)* | **Numerical analysis group internal seminar** *(University of Oxford)* | **Junior Applied Mathematics Seminar** *(University of Oxford)* | **Met Office presentation** *(University of Oxford)* | **Internal presentation** *(Tokamak Energy)*

2022   **PRISM workshop** *(Missenden Abbey, UK)*

Programming Languages

Experienced: Python *(Firedrake)*, MATLAB, LaTeX | **Limited:** Julia, C, Fortran, HTML

Languages

Fluent: English | **Intermediate:** Dutch | **Beginner:** Japanese, German