

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](#)
- Structure-preserving finite-elements methods for inhomogeneous boundary-value problems via auxiliary variables**
- High-order conservative–dissipative integrators for reversible–irreversible systems**
- An augmented Lagrangian preconditioner for natural convection at high Reynolds number**, with [Alexei Gazca](#), [Patrick Farrell](#), [Benjamin Castellaz](#)
- 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 2019 **Perm State University, Internship**, Computational fluid dynamics

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 **EMS school on Mathematical Modelling, Numerical Analysis and Scientific Computing*** (*Kácov, Czechia*) | **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 Mathematics 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