

Boris Andrews CV

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EDUCATION

- 2021 – 2025 **University of Oxford, PhD (DPhil) in Mathematics (Numerical Analysis)**
(predicted)
 - Thesis: *Structure-preserving FEMs via auxiliary variables: conservative & accurately dissipative integrators / global & local structures for BVPs*
 - 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 & dissipation structures | Global & local energy estimates & conservation laws | Asymptotic-preserving integrators | Geometric machine learning

Finite element theory, Finite element exterior calculus (FEEC) | Domain decomposition | Parallel in time (PinT)

Plasma modelling, Magnetohydrodynamics (MHD) | Hybrid fluid-particle models

Turbulent systems, Stabilisation | Preconditioning

PUBLICATIONS & PREPRINTS

- Preprints **High-order conservative and accurately dissipative numerical integrators via auxiliary variables**, with [Patrick Farrell](#), 16 July 2024
 - In review: *IMA Journal of Numerical Analysis* (IMAJNA)
- Topology-preserving discretization for the magneto-frictional equations arising in the Parker conjecture**, with [Mingdong He](#), [Patrick Farrell](#), [Kaibo Hu](#), 20 January 2025
 - In review: *SIAM Journal on Scientific Computing* (SISC)
- Upcoming **Globally and locally structure-preserving mixed finite element methods for boundary-value problems**
(Draft on request) **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 fully conservative integrators for integrable ODE systems
Uniformly accurate asymptotic-preserving integrators for charged particles
- Upcoming **Conservative integrators exhibit greater stability than symplectic integrators on the Toda lattice**, with [Sebastian Ohlig](#), [Patrick Farrell](#)

PROGRAMMING LANGUAGES

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

LANGUAGES

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

PRIZES, AWARDS AND SCHOLARSHIPS

- 2021 – 2025 **DPhil studentship**, Engineering and Physical Sciences Research Council (EPSRC)
CASE award, United Kingdom Atomic Energy Authority (UKAEA)
- 2017 – 2021 **Foundation scholarship**, Worcester College, University of Oxford
Collection prizes, Worcester College, University of Oxford

TALKS (*scheduled/provisional)

INVITED TALKS & MINISYMPOSIUM PRESENTATIONS

- 2025 **ACOMEN*** (Ghent University) | **Numerical Mathematics & Scientific Computing Seminar*** (Rice University) | **SIAM CSE*** (Fort Worth, Texas) | **Scientific Computing Seminar*** (Brown University)

OTHER SEMINAR, WORKSHOP & CONFERENCE PRESENTATIONS

- 2025 **Biennial Numerical Analysis Conference*** (University of Strathclyde) | **EMS school on Mathematical Modelling, Numerical Analysis and Scientific Computing*** (Kácov, Czechia) | **Numerical Analysis Group Internal Seminar*** (University of Oxford)
- 2024 **External seminar** (Rice University) | **Computing Division technical meeting** (UKAEA) | **Firedrake User Meeting** (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** (Waseda University) | **Numerical Analysis Group Internal Seminar** (University of Oxford) | **Junior Applied Mathematics Seminar** (University of Oxford) | **Met Office presentation** (University of Oxford)
- 2022 **PRISM workshop** (Missenden Abbey, UK)

PROFESSIONAL EXPERIENCE

- Jun 2025 **University of Strathclyde**, Joint hosting of minisymposium at the Biennial Numerical Analysis Conference, [Charlie Parker](#)
○ Topic: Structure-preserving finite element methods
- Sep – Oct 2024 **University of Oxford**, Supervision of summer internship, [Sebastian Ohlig](#)
○ Project: Stability study of conservative vs. symplectic integrators on the Toda lattice
- Aug – Oct 2022 **Tokamak Energy**, Internship, Physics: theory and modelling
○ Project: Implementation of non-Maxwellian backgrounds in the GENE gyrokinetic code
○ Supervisor: [Salomon Janhunen](#)
- 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
Tutor, Oriel College, University of Oxford, Analysis I