

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: *Foundations of Computational Mathematics*
- Upcoming **High-order structure-preserving discretisation for ideal MHD arising in the Parker problem**, with [Mingdong He](#), [Kaibo Hu](#), [Patrick Farrell](#)
(Draft on request)
- Globally and locally structure-preserving mixed finite-element methods for boundary-value problems**
- 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 fully conservative integrators for integrable ODE systems**
- Uniformly accurate magnetic moment–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

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*) | **Invited talk*** (*Brown University*) | **Numerical Mathematics & Scientific Computing seminar*** (*Rice University*) | **Firedrake User Meeting USA*** (*Baylor University*)
- 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 2023** (*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*) | **PRISM workshop** (*Missenden Abbey, UK*)

PROFESSIONAL EXPERIENCE

- Sep – Oct **University of Oxford**, *Supervision of summer internship*, [Sebastian Ohlig](#)
2024 ○ Project: *Stability study of conservative vs. symplectic integrators on the Toda lattice*
- Aug – Oct **Tokamak Energy**, *Internship*, *Physics: theory and modelling*
2022 ○ Project: *Implementation of non-Maxwellian backgrounds in the GENE gyrokinetic code*
○ Supervisor: [Salomon Janhunen](#)
- 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*
Tutor, *Oriel College, University of Oxford*, *Analysis I*

LANGUAGES

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