

Boris Andrews CV

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EMPLOYMENT

- 2025 – 2027 **Postdoctoral Research Associate**, Numerical Analysis, University of Oxford
(predicted)
 - Project: ERC Starting Grant for *Geometric Finite Element Methods (GeoFEM)*
 - Advisor: *Kaibo Hu*

EDUCATION

- 2021 – 2025 **PhD (DPhil)**, Numerical Analysis, University of Oxford
 - Thesis: *Geometric numerical integration via auxiliary variables*
 - Supervisors: *Patrick Farrell*, *Wayne Arter*

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

RESEARCH INTERESTS

Structure-preserving/compatible 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

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

LANGUAGES

Programming

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

Spoken

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

PUBLICATIONS & PREPRINTS

Papers

31 Dec 2025 **Enforcing conservation laws and dissipation inequalities numerically via auxiliary variables**, with [Patrick Farrell](#)

○ Publication: *SIAM Journal on Scientific Computing (SISC)*, 47 (6), pp. A3516–A3535

Preprints

(Accepted for publication)

20 Jan 2025 **Helicity-preserving finite element discretization for magnetic relaxation**, with [Mingdong He](#), [Patrick Farrell](#), [Kaibo Hu](#)

○ Accepted: *SIAM Journal on Scientific Computing (SISC)*

(In review)

28 Nov 2025 **Conservative and dissipative discretisations of multi-conservative ODEs and GENERIC systems**, with [Patrick Farrell](#)

○ In review: *Computers & Mathematics with Applications (CAMWA)*

Other works

18 Jul 2025 **Geometric numerical integration via auxiliary variables**

○ Note: *PhD (DPhil) thesis*

In preparation

(Drafts available on request)

Automated Galerkin time stepping in Irksome, with [Pablo Brubeck](#), [Patrick Farrell](#), [Rob Kirby](#), [Scott MacLachlan](#)

Enstrophy-stable integrators for the incompressible Navier–Stokes equations, with [Matin Shams](#)

An augmented Lagrangian preconditioner for natural convection at high Reynolds number, with [Alexei Gazca](#), [Patrick Farrell](#)

Uniformly accurate asymptotic-preserving integrators for charged particles

TEACHING

2024 – 2025 **Tutor**, [Computational Mathematics](#)

2023 – 2024 **Tutor**, *Prelims corner*

Teaching assistant, [Numerical Linear Algebra](#)

2021 – 2022 **Teaching assistant**, [Random Matrix Theory](#)

Tutor, [Analysis I](#), Oriel College

SUPERVISION

Feb – Aug 2025 **Matin Shams**, *MMSC special topic & dissertation*

○ Project: *Enstrophy-stable integrators for the incompressible Navier–Stokes equations*

Sep – Oct 2024 **Sebastian Ohlig**, *Undergraduate summer internship*

○ Project: *Stability study of conservative vs. symplectic integrators on the Toda lattice*

TALKS (*scheduled/provisional)

INVITED TALKS & MINISYMPOSIUM PRESENTATIONS

- 2027 **Oberwolfach Workshop on Structure-Preserving Methods*** (*Oberwolfach Research Institute for Mathematics*)
- 2026 **ECCOMAS World Congress on Computational Mechanics (WCCM)*** (*Munich, Germany*)
- 2025 **(2×)ACOMEN** (*Ghent University*) | **ECCOMAS Thematic Conference on Modern Finite Element Technologies (MFET)** (*Aachen, Germany*) | **Self-Consistency Group Seminar** (*CHaRMNET*) | **ACM Colloquium** (*University of Edinburgh × Heriot-Watt University*) | **Numerical Mathematics & Scientific Computing Seminar** (*Rice University*) | **SIAM CSE** (*Fort Worth, Texas*) | **Scientific Computing Seminar** (*Brown University*) | **METHODS Group Seminar** (*Brown University*)
- 2024 **External Seminar** (*Rice University*)

OTHER SEMINAR, WORKSHOP & CONFERENCE PRESENTATIONS

- 2026 **Workshop on Finite Element Tensor Calculus*** (*Tsinghua University*)
- 2025 **Numerical Analysis Group Internal Seminar** (*University of Oxford*) | **Biennial Numerical Analysis Conference** (*University of Strathclyde*)
- 2024 **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*)

OTHER EXPERIENCE

- 2025 – 2027 **University of Oxford, Organisation of the Numerical Analysis Group's weekly** (predicted) *finite element methods reading group*
- Apr – Jun **University of Vienna, Attendance at the Programme on Differential Complexes at**
2026 *the Erwin Schrödinger International Institute for Mathematics and Physics (ESI)*
- Jun 2025 **University of Strathclyde, Joint organisation of minisymposium at the Biennial Numerical Analysis Conference**
 - Topic: *Structure-preserving finite element methods*
 - Co-organiser: *Charlie Parker*
- Aug – Oct **Tokamak Energy, Internship, Physics: theory and modelling**
2022
 - Project: *Implementation of non-Maxwellian backgrounds in the GENE gyrokinetic code*
 - Supervisor: *Salomon Janhunnen*
- Jul 2022 **United Kingdom Atomic Energy Authority (UKAEA), Plasma physics summer school**