Boris Andrews CV

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EMPLOYMENT

2025 – 2027 (predicted)	**Postdoctoral Research Associate**, *Numerical Analysis*, University of Oxford ○ 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

(Upcoming)

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
(predicted)   **University of Oxford**, *Organisation of the Numerical Analysis Group's weekly finite element methods reading group*

Apr – Jun 2026   **University of Vienna**, *Attendance at the Programme on Differential Complexes at 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 2022   **Tokamak Energy**, *Internship*, Physics: theory and modelling
- Project: *Implementation of non-Maxwellian backgrounds in the GENE gyrokinetic code*
- Supervisor: *Salomon Janhunen*

Jul 2022   **United Kingdom Atomic Energy Authority (UKAEA)**, *Plasma physics summer school*