

# 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

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## PUBLICATIONS & PREPRINTS

### Preprints

- 29 Apr 2025 **Enforcing conservation laws and dissipation inequalities numerically via auxiliary variables**, with [Patrick Farrell](#)  
o Accepted: *SIAM Journal on Scientific Computing (SISC)*  
o Note: *Part 1 of High-order conservative and accurately dissipative numerical integrators [...]*

- 20 Jan 2025 **Helicity-preserving finite element discretization for magnetic relaxation**, with [Mingdong He](#), [Patrick Farrell](#), [Kaibo Hu](#)  
o Accepted: *SIAM Journal on Scientific Computing (SISC)*

### Other works

- 18 Jul 2025 **Geometric numerical integration via auxiliary variables**  
o Note: *PhD (DPhil) thesis*

- 16 Jul 2024 **High-order conservative and accurately dissipative numerical integrators via auxiliary variables**, with [Patrick Farrell](#)  
o Note: *Currently being partitioned into multiple submissions*

### In preparation (Drafts available on request)

#### **Conservative and dissipative time discretisations for conservative and GENERIC systems**, with [Patrick Farrell](#)

- o Note: *Part 2 of High-order conservative and accurately dissipative numerical integrators [...]*

#### **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**

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## 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

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## SUPERVISION

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

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

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

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

## TALKS

### INVITED TALKS & MINISYMPOSIUM PRESENTATIONS

- 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

- 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 *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