

# Boris Andrews CV

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 [borisandrews.github.io](https://borisandrews.github.io)

## 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 **Uniformly accurate asymptotic-preserving integrators for charged particles**  
(Draft on request) **An augmented Lagrangian preconditioner for natural convection at high Reynolds number**, with [Alexei Gazca](#), [Patrick Farrell](#), [Benjamin Castellaz](#)  
**Conservative–dissipative integrators for reversible–irreversible systems**  
**Globally and locally structure-preserving mixed finite element methods for boundary-value problems**
- Upcoming **Enstrophy-stable integrators for the 2D incompressible Navier–Stokes equations**  
**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) | **Self-Consistency Group seminar\*** (CHaRMNET) | **Numerical Mathematics & Scientific Computing Seminar\*** (Rice University) | **SIAM CSE\*** (Fort Worth, Texas) | **Scientific Computing Seminar\*** (Brown University)
- 2024 **External seminar** (Rice 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 Janhunnen](#)
- 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