

# Boris Andrews

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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 finite element methods via auxiliary variables: conservative and accurately dissipative integrators, and energy estimates for inhomogeneous boundary-value problems*
  - 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 and dissipation structures/Global & local energy estimates

**Finite element theory**, Finite element exterior calculus (FEEC)/Domain decomposition/Parallel in time

**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  
  - Submitted to Foundations of Computational Mathematics
  - Submitted to IMA Leslie Fox Prize 2025
- Upcoming (Draft on request) **High-order structure-preserving discretisation for ideal MHD arising in the Parker problem**, with [Mingdong He](#), [Kaibo Hu](#), [Patrick Farrell](#)
- Structure-preserving finite-elements methods for inhomogeneous boundary-value problems via auxiliary variables**
- 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**
- High-order asymptotic-preserving integrators for charged particles in arbitrary magnetic fields**
- Upcoming **Conservative integrators exhibit greater stability than symplectic integrators on the Toda lattice**, with [Sebastian Ohlig](#), [Patrick Farrell](#)

## 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*) | **SIAM DS25\*** (*Denver, Colorado*) | **Invited talk\*** (*Brown University*) | **Firedrake User Meeting USA 2025\*** (*Fort Worth, Texas*) | **Numerical Mathematics & Scientific Computing seminar\*** (*Rice University*)
- 2024 **External seminar** (*Rice University*) | **Computing Division technical meeting** (*UKAEA*) | **Firedrake User Meeting 2024** (*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 Mathematics 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*) | **Internal presentation** (*Tokamak Energy*)
- 2022 **PRISM workshop** (*Missenden Abbey, UK*)

## PROFESSIONAL EXPERIENCE

- Sep – Oct **University of Oxford**, Supervision of summer internship, [Sebastian Ohlig](#)  
2024 ○ Project: Studying the stability of conservative vs. symplectic integrators on the Toda lattice  
○ Co-supervisors: [Patrick Farrell](#)
- Aug – Oct **Tokamak Energy**, Internship, Physics: theory and modelling  
2022
- 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  
**Stipendiary lecturer**, *Oriel College, University of Oxford*, Analysis I

## PROGRAMMING LANGUAGES

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

## LANGUAGES

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

## REFERENCES

**Prof Patrick Farrell**  
Mathematical Institute  
University of Oxford  
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