

Boris Andrews CV

 |  |  |  |  boris.andrews@maths.ox.ac.uk
 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*

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

Preprints (In review)

- 29 Apr 2025 **Enforcing conservation laws and dissipation inequalities numerically via auxiliary variables**, with [Patrick Farrell](#)
- In review: *SIAM Journal on Scientific Computing* (SISC)
 - Note: Part 1 of *High-order conservative and accurately dissipative numerical integrators [...]*
- 20 Jan 2025 **Topology-preserving discretization for the magneto-frictional equations arising in the Parker conjecture**, with [Mingdong He](#), [Patrick Farrell](#), [Kaibo Hu](#)
- In review: *SIAM Journal on Scientific Computing* (SISC)

Other works

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

In preparation (Draft available on request)

Uniformly accurate asymptotic-preserving integrators for charged particles

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

In preparation

Enstrophy-stable integrators for the 2D incompressible Navier–Stokes equations, with [Matin Shams](#)

Conservative integrators exhibit greater stability than symplectic integrators on the Toda lattice, with [Sebastian Ohlig](#)

TEACHING

UNIVERSITY OF OXFORD (2021 – 2025)

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* (Oriol College)

SUPERVISION

UNIVERSITY OF OXFORD (2021 – 2025)

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

2025 ○ Project: *Enstrophy-stable integrators for the 2D Navier–Stokes equations*

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

2024 ○ Project: *Stability study of conservative vs. symplectic integrators on the Toda lattice*

TALKS (*scheduled/provisional)

INVITED TALKS & MINISYMPOSIUM PRESENTATIONS

- 2025 **ACOMEN*** (*Ghent University*) | **ECCOMAS Thematic Conference on Modern Finite Element Technologies*** (*Aachen, Germany*) | **Self-Consistency Group seminar*** (*CHaRMNET*) | **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 **Biennial Numerical Analysis Conference*** (*University of Strathclyde*) | **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 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 Janhunnen](#)
- Jul – Aug 2019 **Perm State University**, Internship, Computational fluid dynamics