

# Kaibo Hu

Maxwell Institute &  
School of Mathematics, University of Edinburgh  
James Clerk Maxwell Building  
Peter Guthrie Tait Road, Edinburgh, EH9 3FD

kaibo.hu@ed.ac.uk  
<https://kaibohu.github.io>

## Employment

Royal Society University Research Fellow & Reader (starting August 2025) School of Mathematics, University of Edinburgh, UK Mathematical Institute, University of Oxford, UK	October 2023 - October 2022 - September 2023
Non-Stipendiary Postdoctoral Research Fellow Christ Church, Oxford, UK	October 2021 - September 2023
Hooke Research Fellow Mathematical Institute, University of Oxford, UK	January 2021 - September 2022
Postdoctoral Associate Department of Mathematics, University of Minnesota, USA	August 2018 - January 2021
Researcher Department of Mathematics, University of Oslo, Norway	August 2017 - August 2018

## Education

2017. Ph.D. in mathematics,  
Beijing International Center for Mathematical Research, Peking University, China.  
Advisor: Prof. Jinchao Xu  
Thesis: *Finite Element Exterior Calculus for Multiphysics Problems*

2012. B.S. in mathematics,  
Nankai University, Tianjin, China.  
Thesis: *Implementation of Nine Discontinuous Galerkin Methods for Convection-Dominated Convection-Diffusion Equations*

## Honors and Awards

- [1] Nachdiplom lectures at ETH Zürich, 2026.
- [2] Semi-plenary talk in Workshop on Foundations of Numerical PDEs, Foundations of Computational Mathematics (FoCM 2026) conference, Vienna.
- [3] Frontiers of Science Award, 2025.  
— for the paper “Complexes from Complexes” with Douglas N. Arnold, by the International Congress of Basic Sciences (ICBS).
- [4] The Feng Kang Visiting Scholar for Young Scientist, Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, 2025.

- [5] ERC Starting Grant, 2024.  
— *Geometric Finite Element Methods (GeoFEM)*.
- [6] SIAM High Impact Article Collection, 2023.  
— “*A Family of Finite Element Stokes Complexes in Three Dimensions*”, K.Hu, Q.Zhang, Z.Zhang, *SINUM* 2022.
- [7] SIAM Computational Science and Engineering Early Career Prize, 2023.  
— for “*contributions to the finite element exterior calculus, particularly structure-preserving numerical algorithms for magnetohydrodynamics.*”
- [8] Royal Society University Research Fellowship, 2022-2027.
- [9] Hooke Research Fellowship, Mathematical Institute, University of Oxford, UK. 2021.
- [10] Non-Stipendiary Postdoctoral Research Fellowship, Christ Church, Oxford. 2021.
- [11] Marie Skłodowska-Curie Individual Fellowship offer, EU, 2020.
- [12] Invitation to the Conference celebrating *Acta Numerica*’s 30th birthday, Banach Center, Będlewo, Poland. June 14-19, 2021.  
— “*...participation will be strictly by invitation: we hope for a good balance between leading experts in computational mathematics and the most brilliant representatives of the younger generation*”
- [13] New World Mathematics Award, 2017,  
— for *Ph.D thesis*
- [14] Outstanding Youth Paper Prize, Beijing Society of Computational Mathematics, September 2016,  
— for the paper “*Stable Finite Element Methods Preserving  $\nabla \cdot \mathbf{B} = 0$  Exactly for MHD Models*”
- [15] Student Paper Prize of East Asian SIAM, June 2016,  
— for the paper “*Structure-preserving Finite Element Methods for Stationary MHD Models*”
- [16] Peking University President Scholarship, 2014-2017.

## Research Interests

I work on numerical partial differential equations and structure-preserving/compatible discretizations. In particular, most of my current work is on finite element exterior calculus (FEEC). I view numerical analysis as a connection between continuous and discrete. Thus, I am interested in its interactions with neighbouring areas, such as discrete geometry and topology, geometric mechanics, network theory, and applications in scientific problems, such as continuum mechanics, numerical relativity and geometric PDEs.

The vision of my current research includes:

- finite element exterior calculus, connections between homological algebra, geometry, numerical analysis and computation; geometric foundations of continuum mechanics,
- advanced numerical methods (high order methods, preconditioning etc.) and applications (fluid and solid mechanics, magnetohydrodynamics etc.),
- discretizations of PDEs and discrete theories (discrete geometry, discrete mechanics etc.),
- structure-preserving approaches for solving the Einstein equations in general relativity, with potential applications in computational astronomy and gravitational-wave sciences,
- scientific computing, computation of spectrum, localization.

## Publications

Link to [Google Scholar Profile](#).

- [1] *Distributional Hessian and divdiv complexes on triangulation and cohomology*, Kaibo Hu, Ting Lin and Qian Zhang; SIAM Journal on Applied Algebra and Geometry (2024).
- [2] *An exterior calculus framework for polytopal methods*, Francesco Bonaldi, Deniele A. Di Pietro, Jérôme Droniou, Kaibo Hu; accepted, Journal of the European Mathematical Society (2024).
- [3] *BGG sequences with weak regularity and applications*, Andreas Čap and Kaibo Hu; Foundations of Computational Mathematics (2024).
- [4] *Discrete tensor product BGG sequences: splines and finite elements*, Francesca Bonizzoni, Kaibo Hu, Guido Kanschat and Duygu Sap; Mathematics of Computation (2024).
- [5] *A discrete elasticity complex on three-dimensional Alfeld splits*, Snorre H. Christiansen, Johnny Guzmán, Jay Gopalakrishnan and Kaibo Hu; Numerische Mathematik. (2024).
- [6] *Quadratic and cubic Lagrange finite elements for mixed Laplace eigenvalue problems on criss-cross meshes*, Kaibo Hu, Jiguang Sun and Qian Zhang; Results in Applied Mathematics (2024).
- [7] *Bounded Poincaré operators for twisted and BGG complexes*, Andreas Čap, Kaibo Hu; accepted, Journal de Mathématiques Pures et Appliquées (2023).
- [8] *Structure-preserving and helicity-conserving finite element approximations and preconditioning for the Hall MHD equations*, Fabian Laakmann, Kaibo Hu and Patrick E. Farrell; Journal of Computational Physics (2023).
- [9] *Finite element systems for vector bundles: elasticity and curvature*, Snorre H. Christiansen and Kaibo Hu; Foundations of Computational Mathematics (2022).
- [10] *A family of finite element Stokes complexes in three dimensions*, Kaibo Hu, Qian Zhang and Zhimin Zhang; SIAM Journal on Numerical Analysis (2022).
- [11] *Spurious solutions for high order curl problems*, Kaibo Hu, Qian Zhang, Jiayu Han, Lixiu Wang, Zhimin Zhang; IMA Journal of Numerical Analysis (2022).
- [12] *Partially discontinuous nodal finite elements for  $H(\text{curl})$  and  $H(\text{div})$* , Jun Hu, Kaibo Hu and Qian Zhang; Computational Methods in Applied Mathematics (2022).
- [13] *Complexes from complexes*, Douglas N. Arnold and Kaibo Hu; Foundations of Computational Mathematics (2021).
- [14] *Helicity-conservative discretization for incompressible MHD systems*, Kaibo Hu, Young-Ju Lee and Jinchao Xu; Journal of Computational Physics (2021).
- [15] *Well-conditioned frames for finite element methods*; Kaibo Hu and Ragnar Winther; Journal of Computational Mathematics (2021).
- [16] *Simple curl-curl-conforming finite elements in two dimensions*, Kaibo Hu, Qian Zhang and Zhimin Zhang; SIAM Journal on Scientific Computing (2020).
- [17] *A characterization of supersmoothness of multivariate splines*, Michael S. Floater and Kaibo Hu; Advances in Computational Mathematics (2020).
- [18] *Poincaré path integrals for elasticity*; Snorre H. Christiansen, Kaibo Hu and Espen Sande; Journal de Mathématiques Pures et Appliquées (2019).
- [19] *Generalized Gaffney inequalities and discrete compactness for discrete differential forms*; Juncai He, Kaibo Hu and Jinchao Xu; Numerische Mathematik (2019).
- [20] *Nonstandard finite element de Rham complexes on cubical meshes*; Andrew Gillette, Kaibo Hu and Shuo Zhang; BIT Numerical Mathematics (2019).
- [21] *Convergence of a B-E based finite element method for MHD models on Lipschitz domains*; Kaibo Hu, Weifeng Qiu and Ke Shi; Journal of Computational and Applied Mathematics (2019).

- [22] *Generalized finite element systems for smooth differential forms and Stokes' problem*, Snorre H. Christiansen and Kaibo Hu, *Numerische Mathematik* (2018).
- [23] *Structure-preserving finite element methods for stationary MHD models*, Kaibo Hu and Jinchao Xu, *Mathematics of Computation* (2019).
- [24] *Nodal finite element de Rham complexes*; Snorre H. Christiansen, Jun Hu and Kaibo Hu, *Numerische Mathematik* (2018).
- [25] *Stable magnetic field-current finite element schemes for magnetohydrodynamics systems (in Chinese)*; Kaibo Hu and Jinchao Xu, *Science China Mathematics* (2016).
- [26] *Robust preconditioners for incompressible MHD models*; Yicong Ma, Kaibo Hu, Xiaozhe Hu, and Jinchao Xu, *Journal of Computational Physics* (2016).
- [27] *Stable finite element methods preserving  $\nabla \cdot \mathbf{B} = 0$  exactly for MHD models*; Kaibo Hu, Yicong Ma and Jinchao Xu, *Numerische Mathematik*, (2017, appearing online 2016).

#### **Book chapters:**

- [28] *Nonlinear elasticity complex and a finite element diagram chase*, Kaibo Hu; to appear in Springer INdAM Series “Approximation Theory and Numerical Analysis Meet Algebra, Geometry, Topology”, edited by Martina Lanini, Henry Schenck. Carla Manni (2024).
- [29] *Supersmoothness of the Alfeld Split*, Michael S. Floater and Kaibo Hu; to appear in Springer INdAM Series “Approximation Theory and Numerical Analysis Meet Algebra, Geometry, Topology”, edited by Martina Lanini, Henry Schenck. Carla Manni (2024).

#### **Preprints:**

- [30] *Many facets of cohomology: Differential complexes and structure-aware formulations*, Kaibo Hu; arXiv (2025).
- [31] *Finite element form-valued forms (I): Construction*, Ting Lin and Kaibo Hu; arXiv:2503.03243 (2025).
- [32] *Topology-preserving discretization for the magneto-frictional equations arising in the Parker conjecture*, Mingdong He, Patrick E. Farrell, Kaibo Hu and Boris D. Andrews; arXiv:2501.11654 (2025).
- [33] *Uniformly hp-stable elements for the elasticity complex*, Francis RA Aznaran, Kaibo Hu and Charles Parker; arXiv:2409.17414 (2024).
- [34] *Convergence analysis of a helicity-preserving finite element discretisation for an incompressible magnetohydrodynamics system*, Lourenco Beirao da Veiga, Kaibo Hu and Lorenzo Mascotto; arXiv:2407.19748 (2024).
- [35] *Extended Regge complex for linearized Riemann-Cartan geometry and cohomology*, Snorre H. Christiansen, Kaibo Hu and Ting Lin; arXiv:2312.11709 (2023).
- [36] *Finite elements for symmetric and traceless tensors in three dimensions*, Kaibo Hu, Ting Lin and Bowen Shi; arXiv:2311.16077 (2023).

#### **Talks**

##### **Invited conference/Workshop talks:**

- [1] IMSI Workshop “Discrete Exterior Calculus: Differential Geometry and Applications”, Chicago, USA. September 2025. (upcoming)
- [2] MS “New generation methods for numerical challenges in curl-div problems: Maxwell, MHD, and derived models”, Advanced COmputational Methods in ENgineering and Applied Mathematics (ACOMEN 2025), Ghent, Belgium, September 2025. (upcoming)

- [3] Section on “Finite element complexes for structure-preservation in computational physics”, Modern Finite Element Technologies 2025 (MFET) ECCOMAS thematic conference, Aachen, Germany, August 2025. (upcoming)
- [4] BIRS workshop “Geometric mechanics formulations for continuum mechanics”, Banff, Canada. March 2025.
- [5] “New and old problems in Numerical Relativity” workshop at the Tsinghua Sanya International Mathematics Forum (TSIMF), Sanya, China. January 2025.
- [6] Minisymposium “Structure-preserving discretization of multiphysics systems”, 16th World Congress on Computational Mechanics and 4th Pan American Congress on Computational Mechanics, Vancouver, Canada. July 2024.
- [7] Minisymposium “Numerical Methods for Geometric PDEs”, The 2024 SIAM Annual Meeting, Spokane, Washington, US. July 2024.
- [8] Keynote lecture at the NEMESIS project kick-off workshop, Montpellier, France. June 2024.
- [9] European Finite Element Fair, London, UK. June 2024.
- [10] Banff International Research Station (BIRS) “Homological Perspective on Splines and Finite Elements” workshop, University of British Columbia Okanagan (UBCO), Canada. May 2024. (*survey talk*)
- [11] Opening Conference of the CNRS Occitan Research Federation in Mathematics (OcciMath), LAMPS (Laboratory of Multidisciplinary Modeling and Simulations), University of Perpignan Via Domitia, France. April 2024.
- [12] The 18th UK Applied Algebra and Geometry network meeting. Swansea University, UK. February 2024.
- [13] Workshop: Theory and Numerics on Some Nonlinear PDEs; University of Oslo / online. October 2023.
- [14] ICIAM, Tokyo, Japan. August 2023.
- [15] The 2023 International Workshop on Scientific Computing, Feng Kang Youth Forum on Scientific Computing (FKYF), The Institute of Computational Mathematics and Scientific/Engineering Computing of Chinese Academy of Sciences, Beijing, China. August 2023.
- [16] PKU Mathematics Forum, Peking University, Beijing, China. July 2023.
- [17] The 29th Biennial Numerical Analysis Conference, University of Strathclyde, Glasgow, UK. June 2023.
- [18] Structure preserving numerical methods for partial differential equations, Bernoulli Center, EPFL, Switzerland. July 2023.
- [19] SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, Netherlands. Feb/26-Mar/03/2023. (*plenary talk*)
- [20] The 8th Workshop for Young Researchers in Scientific Computing, Chinese Academy of Sciences, China (online). Dec/7-8/2022.
- [21] 56th Meeting of the Society for Natural Philosophy: Mechanics and Analysis, Pisa, Italy, Sep/21-23/2022.
- [22] INdAM Meeting “Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology”, Palazzone di Cortona, Italy, Sep/5-9/2022.
- [23] International Conference on Scientific Computation and Differential Equations (SciCADE2022), Reykjavík, Iceland, Jul/25-29/2022.
- [24] 30 years of Acta Numerica conference at the Banach Centre in Będlewo, Poland, Jun/25-Jul/2/2022.
- [25] MFO workshop ”Hilbert Complexes: Analysis, Applications, and Discretizations”, Oberwolfach, Germany, Jun/19-25/2022. (*survey talk*)

- [26] Canadian Applied and Industrial Mathematics Society annual meeting, UBC Okanagan Canada (online), Jun/13-16/2022.
- [27] European Finite Element Fair, Aalto University, Finland, Jun/3-4/2022.
- [28] European Finite Element Fair, Inria, Paris, Sep/10-11/2021. (online)
- [29] Mathematical and Computational Approaches for Solving the Source-Free Einstein Field Equations (virtual talk), ICERM, Brown University, USA, Oct/5-9/2020.
- [30] The Second Conference on Scientific and Engineering Computing for Young Chinese Scientists, on the occasion of Professor Feng Kang's Centenary, Beijing, China, Aug/17-21/2019.
- [31] International Multigrid Conference (IMG2019), Kunming, China, Aug/11-16/2019.
- [32] International Conference on Scientific Computation and Differential Equations (SciCADE), Innsbruck, Austria, Jul/22-26/2019.
- [33] International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain, Jul/15-19/2019.
- [34] Winther workshop in numerical methods, on the occasion of Ragnar Winther's 70th birthday, Oslo, Norway, Mar/14/2019.
- [35] SIAM Minisymposium on Recent Developments in Numerical Methods for Fluids, Joint Mathematics Meeting of AMS and MAA, Baltimore, USA, Jan/16-19/2019.
- [36] European Conference on Numerical Mathematics and Advanced Applications (ENUMATH2017), Voss, Norway, Sep/25-29/2017.
- [37] Forum for young scholars in computational mathematics, Peking University, Beijing, China, Jul/24-28/2017.
- [38] Workshop on adaptive and multigrid methods for multiphysics problems, Beijing, China, Jun/23/2017.
- [39] International Conference on Domain Decomposition, Svalbard, Norway, Feb/6-10/2017.
- [40] Workshop on "Structure and scaling in computational field theories", Oslo, Norway, Oct/26-28/2016.
- [41] 11th East Asia SIAM Conference, Macau, China, Jun/20-22/2016. (*paper prize talk*)
- [42] 14th European finite element fair, Bonn, Germany, May/20-21/2016.
- [43] 14th Copper Mountain Conference on Iterative Methods, Colorado, USA, Mar/20-25/2016.
- [44] The 8th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, Aug/10-14/2015.
- [45] Workshop on Geometry and Computation, Kunming, China, Aug/3-6/2015
- [46] The 2st Peking University Computational Mathematics Student Forum, Beijing, China, Jul/11-12/2015
- [47] Workshop on Numerical Methods for Elasticity and MHD Problems, Beijing, China, Dec/21/2014.
- [48] 11th. World Congress on Computational Mechanics & 5th. European Conference on Computational Mechanics & 6th. European Conference on Computation Fluid Dynamics; Barcelona, Spain, July/25/2014.
- [49] The 2nd Student Forum on Numerical Method of PDEs & the 1st Beijing Computational Mathematical Student Forum, Beijing, China, Jul/13/2014.
- [50] The 1st Peking University Computational Mathematics Student Forum, Beijing, China, Nov/16/2013.

**Colloquium/Seminar talks:**

- [51] Seminar talk at Michigan Technological University, USA, Feb/2025.
- [52] Seminar talk at Zhejiang University, China, Jan/2025.

- [53] Applied Mathematics Seminar, Peking University, China, Dec/2024.
- [54] Applied Geometry, Algebra, and Topology in Edinburgh (AGATE) seminar, Edinburgh, UK, Nov/2024.
- [55] Analysis and PDE Seminar, Durham University, UK, Nov/2024.
- [56] Seminar at Institut supérieur de l'aéronautique et de l'espace (ISAE-SUPAERO), Toulouse, France, Oct/2024.
- [57] Séminaire ACSIOM, Institut Montpelliérain Alexander Grothendieck, Université de Montpellier, France, Oct/2024.
- [58] Seminar talk at Shanghai University of Finance and Economics, China, Sep/2024.
- [59] Seminar talk at Nanjing Normal University, China, Sep/2024.
- [60] Seminar talk at Nankai University, China, Aug/2024.
- [61] Seminar talk at Institute of Computational Mathematics and Scientific/Engineering Computing at Chinese Academy of Sciences, China, Aug/2024.
- [62] Seminar talk at Beijing Institute of Mathematical Sciences and Applications (BIMSA), Beijing, China, Aug/2024.
- [63] Zurich colloquium in applied and computational mathematics, Switzerland, Apr/2024.
- [64] Applied and Computational Analysis Seminar at DAMTP, University of Cambridge, UK, Feb/2024.
- [65] ACM seminar at the Maxwell Institute, Edinburgh, UK, Nov/2024.
- [66] Mathematics Seminar at the University of Dundee, UK. Oct/2023.
- [67] Seminar at the Chinese University of Hong Kong (Shenzhen), Sep/2023.
- [68] Seminar at Shanghai Jiao Tong University, Shanghai, China, Aug/2023.
- [69] Seminar talk at Shanghai University of Finance and Economics, China, Aug/2023.
- [70] Seminar at University of Science and Technology of China, USTC, Aug/2023.
- [71] Computational Mathematics and Applications Seminar, Mathematical Institute, University of Oxford, UK, Feb/23/2022.
- [72] Imperial–UCL Numerics Seminar, London, UK, Feb/22/2022.
- [73] Seminar at TU Delft, the Netherlands, Dec/16/2022.
- [74] Gravity Seminar Series of STAG (gravity/string theory/mathematical physics group) of Mathematical Sciences, University of Southampton, Dec/8/2022.
- [75] Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, Beijing, China, Nov/2022.
- [76] Seminar at University of Hong Kong, China, Oct/05/2022.
- [77] Scientific Afternoon, Christ Church, University of Oxford, UK, Jul/15/2022.
- [78] Culham Centre for Fusion Energy, UK, Apr/26/2022.
- [79] Scientific Computing Seminar, Heidelberg University, Germany, Mar/21/2022.
- [80] PDE Lunch Seminar, University of Oxford, UK, Feb/17/2022.
- [81] North Meets South seminar, Mathematical Institute, University of Oxford, UK, Jan/28/2022.
- [82] Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, Beijing, China, Dec/14/2021. (online)
- [83] Los Alamos National Lab, USA, Dec/8/2021.
- [84] PDE seminar, Mathematical Institute, University of Oxford, UK, Aug/5/2021.
- [85] General relativity journal club, Department of Physics, University of Oxford, UK, Jun/24/2021.

- [86] Numerical analysis internal seminar, University of Oxford, UK, Feb/23/2021.
- [87] Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, Beijing, China, Dec/01-02/2020.
- [88] Zurich Colloquium on Applied and Computational Mathematics, ETH Zürich, Switzerland, Oct/14/2020.
- [89] Applied and Computational Mathematics seminar, Department of Mathematics, University of California, Irvine, USA, Apr/13/2020.
- [90] Harmonic Analysis and Differential Equations (HADES) seminar, Department of Mathematics, University of Illinois at Urbana-Champaign, USA, Sep/27/2019.
- [91] Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, Beijing, China, Jul/17/2017.
- [92] Institute of Computational Mathematics and Scientific/Engineering Computing, Chinese Academy of Sciences, Beijing, China, Jun/22/2017.
- [93] CCMA PDEs and Numerical Methods Seminar Series, Penn State University, USA, Mar/17/2016.
- [94] Lecture of CAS SIAM Student Chapter, Chinese Academy of Sciences, Beijing, China, Nov/24/2014.

## Teaching

### Special lectures

- Nachdiplom lectures at ETH Zürich, 2026.
- Invited lectures: *Einstein equations and discretisation*, Hong Kong Polytechnic University. May 2025. (upcoming)
- Invited lectures: Spotlights in Computational Physics and Engineering (SCoPE), University of Luxembourg. March 2025. (upcoming)
- Invited lectures: *Differential complexes and Bernstein-Gelfand-Gelfand construction*. 2024, Institut Montpellierain Alexander Grothendieck (IMAG), Université de Montpellier, France.

### Regular teaching

- 2024 Spring: Research Skills for Computational Applied Mathematics (MATH11197, Post-graduate Course), University of Edinburgh.
- 2024 spring semester: Finite element exterior calculus (advanced course for MAC-MIGS CDT), University of Edinburgh.
- 2023 Trinity Term - 2023 Hilary Term: Calculus of Variations (Christ Church, tutorials + revision), MMSC dissertation projects (Mathematical Institute), University of Oxford.
- 2022 Michaelmas Term: BSP project, University of Oxford.
- 2022 Hilary Term: MMSC Modelling Case Studies, University of Oxford.
- 2021 Michaelmas Term: Finite element exterior calculus, University of Oxford.



## **Supervision and mentorship**

### **Starting in 2025 fall**

#### *Postdoctoral fellow*

- Boris Andreas (DPhil: University of Oxford)
- Jia Jia Qian (PhD: Monash University)
- Puchun Zhou (PhD: Fudan University)
- Ganghui Zhang (PhD: Tsinghua University)

#### *PhD students*

- Mark Alvares Peres (MSc: University of Edinburgh)
- Karl Olav Tyssvang (MSc: University of Oslo)
- Yuechen Zhu (Bachelor: Peking University, Turing Class)

## **Current**

#### *Postdoctoral fellow*

- 2025–. Yizhou Liang (PhD: Peking University).

#### *PhD students*

- Wouter Tonnon, ETH Zürich, 2023– (co-supervision with Ralf Hiptmair)

## **Past**

#### *Postdoctoral fellow*

- 2024. Marien Hanot (PhD: Université de Montpellier).  
Next position: Maître de conférences, Laboratoire Paul Painlevé, Université de Lille.

#### *PhD students*

- Fabian Laakmann, University of Oxford, 2021-2022 (co-supervision with Patrick Farrell).

#### *Visiting PhD students*

- Daniel Førlund Holmen, University of Bergen, 2024.

#### *MSc dissertation*

- 2024: MSc in Computational Applied Mathematics (CAM), University of Edinburgh.
- 2023, 2021: MSc in Mathematical Modelling and Scientific Computing (MMSC), University of Oxford.

#### *Undergraduate research*

- 2023: Bowen Shi, Peking University.  
Next position: PhD student, Oden Institute, University of Texas at Austin.

## Grants

- [1] 2025, Erwin Schrödinger Institute thematic program “Hilbert complexes” (with Čap, Hiptmair, Schöberl), €60k
- [2] 2024, ERC Starting Grant, €1.48m
- [3] 2024, Royal Society International Exchanges Grant, £10.9k
- [4] 2024, ICMS Research in Groups Funding (join with Snorre H. Christiansen, Johnny Guzmán, Michael Neilan, Qian Zhang). £11k
- [5] 2022, Royal Society University Research Fellowship (with extended expenses). £960.3k

## Academic Leadership, Management and Citizenship

- 2023-present, Co-organiser of the weekly Applied and Computational Mathematics (ACM) Seminars at the Maxwell Institute (joint between University of Edinburgh and Heriot-Watt University).
- 2024-present, Postdoc Champion, School of Mathematics, University of Edinburgh.
- Reviewer for most major numerical analysis journals, such as Foundations of Computational Mathematics, IMA Journal of Numerical Analysis, Journal of Computational Physics, M3AS, Mathematics of Computation, Numerische Mathematik, Proceedings of the Royal Society A, SIAM Journal of Numerical Analysis, SIAM Journal of Scientific Computing, Springer Lecture Notes in Mathematics.
- Reviewer, scientific proposals for Banff International Research Station (BIRS).
- Judge for talk prizes, SIAM UKIE National Student Chapter Conference, June 2023, Oxford.
- Dphil thesis examiner (University of Oxford, 2023).
- 2021-2023, Early Career Researchers (ECR) Committee Member, Mathematical Institute, University of Oxford.
- (Co-)organiser of professional meetings and workshops and schools:
  - [1] SciCADE, the International Conference on Scientific Computation and Differential Equations, Edinburgh, UK, 2026. (upcoming)
  - [2] Thematic program on “Differential Complexes: Theory, Discretization, and Applications” at the Erwin Schrödinger Institute (ESI) in Vienna. (with Andreas Čap, Ralf Hiptmair and Joachim Schöberl, upcoming)
  - [3] Workshop on Finite Element Tensor Calculus at the Tsinghua Sanya International Mathematics Forum (TSIMF) during January 12-16, 2026. (with Marien Hanot, Shuo Zhang and Weiyang Zheng, upcoming)
  - [4] Conference on Structure-Preserving Finite Element Methods, to be held at the Institute of Computational Mathematics and Scientific/Engineering Computing (ICMSEC), Chinese Academy of Sciences, Beijing, China, during January 8-10, 2026. (with Shuo Zhang and Weiyang Zheng, upcoming)
  - [5] IMSI Workshop “Discrete Exterior Calculus: Differential Geometry and Applications”, Chicago, USA, Sep/3-5/2025. Co-organizer, with Anil Hirani and Kaushik Kalyanaraman. (upcoming)
  - [6] Two-Week School in Mathematical Physics, within the Mathematics for Humanities program at ICMS, Edinburgh. June/2025. Co-organizer, with Sujay Ashok, Nabamita Banerjee, Babak Haghighat, Yang-Hui He, Shailesh Lal, Wei Li, Sameer Murthy. (upcoming)
  - [7] Mac-Migs PhD Programme Deep Dive event “finite element software”, Maxwell Institute, Edinburgh, UK. Nov/12-13/2024. Co-organizer, with Lehel Banjai, Emmanuil Georgoulis and John Pearson.

- [8] Mini-symposium, *Finite element complexes and multivariate splines*, ICIAM, Tokyo, Japan, Aug/20-25/2023. Co-organizer, with Nelly Villamizar.
- [9] Mini-symposium, *Structure-preserving discretization of Hilbert complexes*, the 29th Biennial Numerical Analysis Conference, University of Strathclyde, Glasgow, UK, Jun/27-30/2023. Co-organizer, with Deepesh Toshniwal.
- [10] Scientific Afternoon, Christ Church, University of Oxford, UK, Apr/27/2023. Co-organizer, with Davide Spriano.
- [11] Mini-symposium, *Exterior Calculus in Numerical Computing, Modeling, and Simulation*, SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam, Netherlands. Co-organizer, with Ari Stern, James P. Fairbanks, Ingebord Gjerde.
- [12] Mini-symposium, *Structure-preserving numerical methods for plasma models*, International Conference on Scientific Computation and Differential Equations (SciCADE2022), Reykjavik, Iceland, Jul/25-29/2022. Co-organizer, with Cecilia Pagliantini.
- [13] Scientific Afternoon, Christ Church, University of Oxford, UK, Jul/15/2022. Co-organizer, with Davide Spriano.
- [14] Mini-symposium, *Geometric numerical methods for fluids and electromagnetic fields*, International Multigrid Conference (IMG2019), Kunming, China, Aug/11-16/2019. Co-organizer, with Yajuan Sun.
- [15] Mini-symposium, *Finite element exterior calculus and applications*, International Congress on Industrial and Applied Mathematics (ICIAM 2019), Valencia, Spain, Jul/15-19/2019. Co-organizer, with Shuo Zhang.
- [16] Workshop on FEEC and High Order Methods; University of Oslo, Norway, Jun/04-06/2018. Co-organizer, with Ragnar Winther.
- [17] The 3rd Student Forum on Numerical Method of PDEs & the 2nd Beijing Computational Mathematical Student Forum; Peking University, Beijing, China, Aug/18-19/2015.
- [18] Workshop on Geometry and Computation, Kunming, China, Aug/3-6/2015. Co-organizer, with Gang Tian, Jinchao Xu, Xiao Zhang.
- [19] The 2nd Student Forum on Numerical Method of PDEs & the 1st Beijing Computational Mathematical Student Forum; Peking University, Beijing, China, Jul/13/2014.