Umberto Zerbinati

Curriculum Vitae

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Education

2022–present **DPhil in Mathematics, University of Oxford**, *Oxford*, United Kingdom
Supervisors: Prof. Patrick E. Farrell.

2020–2022 **Master Degree in Applied Mathematics, KAUST**, *Thuwal*, Saudi Arabia
Thesis Title: A Priori Error Analysis For A Penalty Finite Element Method
Supervisors: Prof. Daniele Boffi, GPA: 3.74/4.

2016–2020 **Bachelor Degree in Mathematics, University of Pavia**, *Pavia*, Italia
Thesis Title: Second Order Finite Difference Methods For The Wave Equation With Dirichlet Boundary Conditions
Supervisors: Prof. Andrea Moiola and Prof. Ilaria Perguia, Graduation Grade: 106/110.

2019 **Erasumus+ Traineeship, University of Vienna**, *Vienna*, Austria
Research Topic: Numerical solution of the wave equation.

2016–2019 **Collegio Ghislieri**, *Pavia*, Italia

Teaching Experience

2025–present **Stipendary Lecturer**, *Oriel College*, Oxford

Spring Break **Visiting Lecturer on spectral theory and spectral practice**, *University of Edinburgh*, Edinburgh
Invited by: Prof. Kaibo Hu

Hilary 2025 **Lecturer on numerical solution of IVP as part of Numerical Analysis (A7)**, *Mathematical Institute*, Oxford
Lecturer: Prof. Charles Parker.

Michaelmas 2023 **TA for Applied Partial Differential Equations (B5.2)**, *Mathematical Institute*, Oxford
Lecturer: Prof. Andreas Muench.

Michaelmas 2023 **Tutor for Metric Spaces and Complex Analysis (A2)**, *Wadham college*, Oxford
Lecturer: Prof. Dmitry Belyaev and Prof. Panagiotis Papazoglou.

Hilary and Trinity 2023 **Tutor for Numerical Analysis (A7)**, *Magdalen College*, Oxford
Lecturer: Prof. Andrew Wathen.

Michaelmas 2022 **TA for Numerical Linear Algebra (C6.1)**, *Mathematical Institute*, University of Oxford
Lecturer: Prof. Yuji Nakatsukasa.

Research Visit

March 2023 **University of Catania**, *Working with Prof. Giovanni Russo*
Research Topic: Particle pushers for non-Hamiltonian systems.

December 2019 **University of Vienna**, *Working with Prof. Anastasia Molchanova*
Research Topic: Finite element discretisations for elasticity.

Software Development

	Level	Skill	Comment
Language:	■■■■■	Python	*I contribute to software libraries PETSc and Firedrake. I develop and maintain my own software library, ngsPETSc.*
	■■■□□	C++	*I contribute to the software library Netgen and NGSolve.*

References

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[2] Clarissa Astuto, Armando Coco, and Umberto Zerbinati. A comparison of the coco-russo scheme and 👻-FEM for elliptic equations in arbitrary domains. *arXiv preprint (2405.16582)*, 2024.

[3] Jack Betteridge, Patrick E. Farrell, Matthias Hochsteger, Christopher Lackner, Joachim Schöberl, Stefano Zampini, and Umberto Zerbinati. ngsPETSc: A coupling between NETGEN/NGSolve and PETSc. *Journal of Open Source Software*, 9(104):7359, 2024.

[4] Patrick E. Farrell, Giovanni Russo, and Umberto Zerbinati. Kinetic derivation of an inviscid compressible Leslie-Ericksen equation for rarified calamitic gases. *Multiscale Modeling and Simulation*, 2024.

[5] Patrick E. Farrell, Tim van Beeck, and Umberto Zerbinati. Analysis and numerical analysis of the helmholtz-korteweg equation, 2025.

[6] Patrick E. Farrell and Umberto Zerbinati. Time-harmonic waves in korteweg and nematic-korteweg fluids. *Phys. Rev. E*, 111:035413, Mar 2025.

[7] Lorenzo Lazzarino, Yuji Nakatsukasa, and Umberto Zerbinati. Preconditioned normal equations for solving discretised partial differential equations, 2025.

[8] Manuel Trezzi and Umberto Zerbinati. When rational functions meet virtual elements: the lightning virtual element method. *Calcolo*, 61(3):35, Jun 2024.

[9] Manuel Trezzi and Umberto Zerbinati. The high-order lightning virtual element method. In Francesco Marmo, Salvatore Cuomo, and Arsenio Cutolo, editors, *Computational Mechanics and Applied Mathematics: Perspectives from Young Scholars*, pages 237–246, Cham, 2025. Springer Nature Switzerland.

[10] Manuel Trezzi and Umberto Zerbinati. The lightning virtual element method for self-adjoint eigenvalue problems. In Francesco Marmo, Salvatore Cuomo, and Arsenio Cutolo, editors, *Computational Mechanics and Applied Mathematics: Perspectives from Young Scholars*, pages 247–257, Cham, 2025. Springer Nature Switzerland.

[11] Tim van Beeck and Umberto Zerbinati. An adaptive mesh refinement strategy to ensure quasi-optimality of the conforming finite element method for the Helmholtz equation via T-coercivity. *arXiv preprint (2403.06266)*, 2024.

[12] Stefano Zampini, Umberto Zerbinati, George Turkyyiah, and David Keyes. PETScML: Second-order solvers for training regression problems in scientific machine learning. In *Proceedings of the Platform for Advanced Scientific Computing Conference*, PASC '24, New York, NY, USA, 2024. Association for Computing Machinery.

[13] Umberto Zerbinati. PINNs and GaLS: A priori error estimates for shallow physics informed neural networks applied to elliptic problems. *IFAC-PapersOnLine*, 55(20):61–66, 2022. 10th Vienna International Conference on Mathematical Modelling MATHMOD 2022.