

Ioannis P. A. Papadopoulos

Weierstrass Institute

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RESEARCH INTERESTS

Numerical analysis, scientific computing, and hp -finite element methods for nonlinear partial differential equations, quasi-variational inequalities, and topology optimization.

EMPLOYMENT

Hooke Research Fellow, <i>University of Oxford</i>	start date Jan. 2026
BMS Dirichlet Fellow, <i>Weierstrass Institute Berlin</i>	Nov. 2023 – date
Research Associate, <i>Imperial College London</i>	Jul. 2021 – Nov. 2023
· EPSRC Grant: <i>Spectral element methods for fractional differential equations, with applications in applied analysis and medical imaging</i> , PI: Dr Sheehan Olver.	
· Leverhulme Trust Research Project Grant: <i>Constructive approximation theory on and inside algebraic curves and surfaces</i> .	
The MathWorks, Inc., Cambridge	2019 – 2020
· Two summer placements, with the GPU & deep learning group and the parallel toolbox group.	

EDUCATION

PhD in Mathematics, <i>University of Oxford</i> , viva date: 24 Sep. 2021	2017 – 2021
· Title: <i>Computing Multiple Solutions of Topology Optimization Problems</i> .	
· Supervisors: Prof. Patrick Farrell and Prof. Endre Süli FRS.	
· EPSRC Centre for Doctoral Training in Partial Differential Equations.	
MSc in Mathematical Modelling and Scientific Computing, <i>University of Oxford</i> (Distinction)	2016 – 2017
· Dissertation: <i>Computing and Controlling Transitions in Multi-Stable Partial Differential Equations</i> supervised by Prof. Patrick Farrell.	
BSc in Mathematics, <i>Imperial College London</i> (First Class Honours)	2013 – 2016

NOTABLE PRIZES

· IMA Leslie Fox Prize in Numerical Analysis , second place, for “mathematical and algorithmic brilliance in tandem with presentational skills”.	2023
· MathWorks PhD scholarship	2017–2021
· Oxford three-minute thesis competition (first place)	2019
· Durham Prize , awarded by Keble College for performance during an MSc.	2017
· Gerald Whitrow Prize , awarded for excellence during the final undergraduate examinations.	2016
· Dean’s List , awarded to the top 10% of the cohort.	2016
· London Mathematical Society undergraduate research bursary.	2015
· Imperial College London Undergraduate Research Bursary.	2014

SUPERVISING & TEACHING

Guest Lecturer, Department of Mathematics, Imperial College London 2023

- “Finite elements: numerical analysis” (Part 1, MATH60022).

Co-supervisor, Department of Mathematics, Imperial College London 2021– 2022

- Co-supervised two 4th year undergraduate dissertations.
- Co-supervised a 2nd year group project on deflation who won the **Winton Capital Second Year Project Prize**.

Teaching Assistant/Tutor, Mathematical Institute, University of Oxford 2018 – 2021

- Courses: continuous optimization (year 3/4 course), numerical linear algebra (year 3/4 course), functional analysis I (year 3 course), numerical solution of differential equations I (year 3 course), numerical solution of differential equations II (year 3 course), scientific computing and numerical analysis of PDEs (PhD course), further PDEs (MSc course).
- Marking and presenting solutions of problems to students.

Tutor, Oxford Study Abroad Programme, University of Oxford 2020 – 2021

- Continuous Optimization - one-on-one tutoring covering the UCLA syllabus in 8 weeks.

MATHEMATICAL ENGAGEMENT

- Organizer of the Research Group 8 Seminars at the Weierstrass Institute. 2024–date
- Assistant in the Imperial-UCL Numerical Analysis Seminars. 2022–2023
- Organizer of minisymposia at CSE23, Biannual NA conferences (2023, 2025), and ENUMATH 2025. 2023–2025
- President of the University of Oxford SIAM Student Chapter. 2020–2021
- Co-founder of the Oxford numerical analysis reading group. 2019–date
- Peer reviewer for Foundations of Computational Mathematics, SIAM Journal on Scientific Computing, SIAM Journal on Numerical Analysis, SIAM Journal on Optimization, Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales, Optimization Methods and Software, Structural and Multidisciplinary Optimization, Computer Methods in Applied Mechanics and Engineering, and Journal of Scientific Computing.

TALKS

Highlighted talks (selected from over 50 presentations, 8 invited & expensed):

Latent variable proximal point for variational problems with inequality constraints

- Biennial Numerical Analysis Conference in Glasgow, UK June 2025

Numerical analysis of a topology optimization problem for Stokes flow/linear elasticity

- IMA Leslie Fox Prize Competition (second place). June 2023
- Joint UCL-Imperial College London Numerical Analysis Seminar. November 2022

A sparse hp -finite element method for rectangles, disks, annuli, and cylinders

- CSE 2025. March 2025
- Bath Numerical Analysis Seminar. October 2023

Sparse spectral methods for fractional PDEs

- ICOSAHOM 2023 in Tokyo, Japan. August 2023
- University of Leicester CSE Mathematics Seminar. October 2022

Computing multiple solutions of topology optimization problems

- RICAM Special Workshop in Linz, Austria October 2025
- USNCCM17 in Albuquerque, New Mexico. July 2023

- [15] A. Alphonse, P. Dvurechensky, **I. P. A. Papadopoulos**, C. Sirotenko, LeAP-SSN: a semismooth Newton method with global convergence rates (2025). <https://arxiv.org/abs/2508.16468>.
- [14] **I. P. A. Papadopoulos**, Hierarchical proximal Galerkin: a fast hp -FEM solver for variational problems with pointwise inequality constraints (2024). <https://arxiv.org/abs/2412.13733>.
- [13] T. S. Gutleb, **I. P. A. Papadopoulos**, Explicit fractional Laplacians and Riesz potentials of classical functions (2023). <https://arxiv.org/abs/2311.10896>.

PUBLICATIONS

- [12] K. Knook, S. Olver, **I. P. A. Papadopoulos**, Quasi-optimal complexity hp -FEM for the Poisson equation on a rectangle, *IMA Journal of Numerical Analysis* (2025). <https://doi.org/10.1093/imanum/draf102>.
- [11] A. Alphonse, C. Christof, M. Hintermüller, **I. P. A. Papadopoulos**, A globalized inexact semismooth Newton method for nonsmooth fixed-point equations involving variational inequalities, *Computational Optimization and Applications* (2025). <https://doi.org/10.1007/s10589-025-00722-8>.
- [10] **I. P. A. Papadopoulos**, T. S. Gutleb, J. A. Carrillo, S. Olver, A frame approach for equations involving the fractional Laplacian, *IMA Journal of Numerical Analysis* (2025). <https://doi.org/10.1093/imanum/draf086>.
- [9] Jørgen S. Dokken, Patrick E. Farrell, Brendan Keith, **I. P. A. Papadopoulos**, Thomas M. Surowiec, The latent variable proximal point algorithm for variational problems with inequality constraints, *Computer Methods in Applied Mechanics and Engineering* (2025). <https://doi.org/10.1016/j.cma.2025.118181>.
- [8] **I. P. A. Papadopoulos**, S. Olver, A sparse hierarchical hp -finite element method on disks and annuli, *Journal of Scientific Computing* (2025). <https://doi.org/10.1007/s10915-025-02964-4>.
- [7] **I. P. A. Papadopoulos**, Numerical analysis of the SIMP model for the topology optimization problem of minimizing compliance in linear elasticity, *Numerische Mathematik* (2024). <https://doi.org/10.1007/s00211-024-01438-3>.
- [6] **I. P. A. Papadopoulos**, T. S. Gutleb, R. M. Slevinsky, S. Olver, Building hierarchies of semiclassical Jacobi polynomials for spectral methods in annuli, *SIAM Journal on Scientific Computing* (2024). <https://doi.org/10.1137/23M160846X>.
- [5] **I. P. A. Papadopoulos**, S. Olver, A sparse spectral method for fractional differential equations in one-spatial dimension, *Advances in Computational Mathematics* (2024). <https://doi.org/10.1007/s10444-024-10164-1>.
- [4] **I. P. A. Papadopoulos**, P. E. Farrell, Preconditioners for computing multiple solutions in three-dimensional fluid topology optimization, *SIAM Journal on Scientific Computing* (2023). <https://doi.org/10.1137/22M1478598>.
- [3] **I. P. A. Papadopoulos**, Numerical analysis of a discontinuous Galerkin method for the Borrvall–Petersson topology optimization problem, *SIAM Journal on Numerical Analysis* (2022). <https://doi.org/10.1137/21M1438943>.
- [2] **I. P. A. Papadopoulos**, E. Süli, Numerical analysis of the topology optimization of Stokes flow, *Journal of Computational and Applied Mathematics* (2022). <https://doi.org/10.1016/j.cam.2022.114295>.
- [1] **I. P. A. Papadopoulos**, P. E. Farrell, T. M. Surowiec, Computing multiple solutions of topology optimization problems, *SIAM Journal on Scientific Computing* (2021). <https://doi.org/10.1137/20M1326209>.