Ioannis P. A. Papadopoulos

Weierstrass Institute
papadopoulos@wias-berlin.de

EMPLOYMENT

BMS Dirichlet Postdoctoral Fellow, *Weierstrass Institute* Nov. 2023 – date

- Hosted by Prof. Dr. Michael Hintermüller at WIAS.
- Research interests: Numerical analysis, spectral & finite element methods, fractional & nonlinear PDEs, topology optimization.

Research Associate, *Imperial College London* Jul. 2021 – Nov. 2023

- EPSRC Grant: *Spectral element methods for fractional differential equations, with applications in applied analysis and medical imaging.*
- Leverhulme Trust Research Project Grant: *Constructive approximation theory on and inside algebraic curves and surfaces.*

The MathWorks, Inc., *Cambridge* 2019 – 2020

- Undertook an 8 week placement with the GPU & deep learning group (2020) and an 8 week placement with the parallel toolbox group (2019).
- Generated use cases for higher order automatic differentiation in **deep learning**.
- Developed the framework for a C++ wrapping of cuSOLVER CUDA functions.

NOTABLE PRIZES

- **IMA Leslie Fox Prize in Numerical Analysis**, second place, for the numerical analysis of divergence-free finite element methods for the topology optimization of fluids. 2023
- **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

EDUCATION

DPhil in Mathematics, *University of Oxford*, viva date: 24 Sep. 2021 2017 – 2021

- Title: *Computing multiple solutions of topology optimization problems.*
- Supervisors: Prof. Patrick Farrell and Prof. Endre Süli.
- EPSRC Centre for Doctoral Training in Partial Differential Equations.
- **Scholarships:** Obtained a **MathWorks scholarship** for financial support during a PhD.
- **Awards:** Judges' and people's first choice in the departmental three-minute thesis competition.

MSc in Mathematical Modelling and Scientific Computing, 2016 – 2017
University of Oxford (Distinction)

- Dissertation: *Computing and controlling transitions in multi-stable partial differential equations* supervised by Prof. Patrick Farrell.

BSc in Mathematics, *Imperial College London* (First Class Honours) 2013 – 2016

- **Scholarships:** Imperial College London Undergraduate Research Bursary (2014) to undertake research during the summers of my undergraduate degree.

PUBLICATIONS

- **I. P. A. Papadopoulos**, P. E. Farrell, T. M. Surowiec, *Computing multiple solutions of topology optimization problems*, SIAM Journal on Scientific Computing, 2021; link to paper, link to software.

- **I. P. A. Papadopoulos**, E. Süli, *Numerical analysis of a topology optimization problem for Stokes flow*, Journal of Computational and Applied Mathematics, 2022; link to paper.
- **I. P. A. Papadopoulos**, *Numerical analysis of a discontinuous Galerkin method for the Borrvall-Petersson topology optimization problem*, SIAM Journal on Numerical Analysis, 2022; link to paper.
- **I. P. A. Papadopoulos**, P. E. Farrell, *Preconditioners for computing multiple solutions in three-dimensional fluid topology optimization*, to appear in SISC, 2023; link to preprint, link to software.
- **I. P. A. Papadopoulos**, S. Olver, *A sparse spectral method for fractional differential equations in one-spacial dimension*, submitted, 2022; link to preprint.
- **I. P. A. Papadopoulos**, *Numerical analysis of the SIMP model for the topology optimization problem of minimizing compliance in linear elasticity*, submitted, 2023; link to preprint.
- **I. P. A. Papadopoulos**, T. S. Gutleb, R. M. Slevinsky, S. Olver, *Building hierarchies of semiclassical Jacobi polynomials for spectral methods in annuli*, submitted, 2023; link to preprint.
- **I. P. A. Papadopoulos**, T. S. Gutleb, J. A. Carrillo, S. Olver, *A frame approach for equations involving the fractional Laplacian*, submitted, 2023; link to preprint.
- T. S. Gutleb, **I. P. A. Papadopoulos**, *Explicit fractional Laplacians and Riesz potentials of classical functions*, submitted, 2023; link to preprint.

TALKS

A sparse *hp*-finite element method for the Helmholtz equation posed on disks, annuli, and cylinders

- Bath Numerical Analysis Seminar — October 2023
- Oxford Numerical Analysis Internal Seminar — October 2023

Sparse spectral methods for fractional PDEs

- 29th Biennial Numerical Analysis Conference — July 2023
- SIAM Conference on Computational Science and Engineering (CSE23) — April 2023
- University of Leicester CSE Mathematics Seminar — October 2022
- Imperial Numerics and Acoustics workshop — September 2022
- PDE CDT Reunion Conference — July 2022

Numerical analysis of a topology optimization problem for Stokes flow

- IMA Leslie Fox Prize in Numerical Analysis — June 2023
- Joint UCL-Imperial College London Numerical Analysis Seminar — October 2021
- Numerical analysis internal seminar at the University of Oxford — May 2021
- PDE CDT Lunchtime Seminar at the University of Oxford — January 2021

Preconditioners for computing multiple solutions in 3D fluid topology optimization

- PRISM Workshop — January 2022
- Numerical analysis internal seminar at the University of Oxford — January 2021

Computing multiple solutions of topology optimization problems

- GAMM 2022 Conference - Young Researcher's minisymposium — August 2022
- Oxbridge Applied Mathematics "Woolly Owl" Meeting — September 2021
- World Congress of Structural and Multidisciplinary Optimization (WCSMO14) — July 2021
- ICOSAHOM 2020/2021 Conference — July 2021
- FEniCS 2021 Conference — March 2021
- Numerical analysis internal seminar at the University of Oxford — January 2021
- PDE CDT Lunchtime Seminar at the University of Oxford — January 2021
- Numerical analysis internal seminar at the University of Oxford — December 2019
- PDE CDT student seminar at the University of Oxford — December 2019
- Junior applied mathematics seminar at the University of Oxford — December 2019
- Internal seminar at Universität Bayreuth — July 2019

SUPERVISING & TEACHING

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

- Assist in the Imperial-UCL Numerical Analysis Seminar 2022–2023
- Organizer of a minisymposium at CSE23 on fast spectral methods February 2023
- President of the University of Oxford SIAM Student Chapter 2020–2021
- Active member of the Oxford numerical analysis reading group 2019–date
- Peer reviewer for three journals 2021–date

ADDITIONAL INFORMATION

Languages English (native), Greek (fluent)
Computing Julia, Python (FEniCS & Firedrake), MATLAB, LaTeX, C, C++