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

· [Second place in IMA Leslie Fox Prize] **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, 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**, P. E. Farrell, *Preconditioners for computing multiple solutions in three-dimensional fluid topology optimization*, SIAM Journal on Scientific Computing, 2023; link to paper. 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 4$^{\text{th}}$ year undergraduate dissertations.
· Co-supervised a 2$^{\text{nd}}$ 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 minisymposiums at CSE23 and Biannual NA conferences · · · · · · · · · · · · · · · · · 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 Foundations of Computational Mathematics, SIAM Journal on Numerical Analysis, Structural and Multidisciplinary Optimization, and Computer Methods in Applied Mechanics and Engineering · 2021–date

ADDITIONAL INFORMATION

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