Jake Bowhay

jb9.bowhay@gmail.com · linkedin.com/in/jake-bowhay/ · github.com/j-bowhay
Nationality: British

Research Interests

Mathematical Biology. Mathematical models of cell polarity.

Pattern Formation. Reaction diffusion equations and the effect of domain growth.

Scientific Computing. Efficient implementation of numerical methods and the development of open source software.

Rational Approximation. Application of the AAA algorithm to problems in applied maths.

Education

2025 – Present **University of Bristol**, PhD in Engineering Mathematics
- Researching mechanical-biochemical cell polarity using reaction-diffusion models and localised pattern formation, supervised by Prof. Alan Champneys and Dr. Matthew Hennessy

2023 – 2024 **University of Oxford**, MSc in Mathematical Modelling and Scientific Computing
(Distinction 79%)
- Studied a range of courses: applied mathematics (Applied PDEs, Further Mathematical Biology, Nonlinear Dynamics) and numerical analysis (Numerical Linear Algebra, Finite Element Method for PDEs, Continuous optimisation)
- Completed written projects in Further Mathematical Biology ("Pattern Formation in the Brusselator System on Fixed, Growing, and Contracting Domains") and Finite Element Method for PDEs ("Numerical Solutions of the Diffusion Equation Using the Finite Element Method")
- Presented a novel numerical method in my dissertation "Computing Zeros and Poles of Complex Functions Numerically", supervised by Prof. Yuji Nakatsukasa and Dr. Irwin Ziad

2019 – 2023	**University of Bristol**, BEng Engineering Mathematics with a Year in Industry (*First Class Honours 84%*)

- A broad applied mathematics degree focusing on mathematical modelling and scientific computing
- Placement year at the Centre for Modelling and Simulation
- Undertook industrial mathematical modelling projects with DSTL and Sagentia Innovation

Honors and Scholarships

2024	Kathryn Gillow Prize (Mathematical Institute, University of Oxford)
	Awarded for the highest scoring dissertation in cohort (£500).
2023	MMSC Industrially Funded Scholarship (Mathematical Institute, University of Oxford)
	Awarded based on strength of application and interview performance (£5000).
2023	Best Final Year Project (University of Bristol)
	Awarded for industrial modelling projects on ocean eddy currents (DSTL) and effective conductivity of polycrystalline structures (Sagentia Innovation).
2022	Boeing Scholarship (University of Bristol)
	Awarded based on second year results (£1100).

Publications

In review:

2025	**Vectorized, Python Array API Standard Compatible Functions for Quadrature, Series Summation, Differentiation, Optimization, and Root Finding in SciPy**
	Matt Haberland, Albert Steppi, Pamphile Roy, and Jake Bowhay
	Journal of Open Source Software.

Talks

February 2023	**Ocean Eddy Current Detection**
	UK Civil Service mathematics and statistics community

Industry Experience

Summer 2023	**Centre for Modelling and Simulation (Summer Intern)** – Bristol, UK

- Studied and developed a continuum model of a resin flow in carbon fibre and researched stabilisation techniques for solving hyperbolic problems using the finite element method
- Contributed to MOOSE, the Idaho National Lab FEM code
- Developed method to speed up a FEM model of a 3D-printed part by 30%

2021 – 2022	**Centre for Modelling and Simulation (Year in Industry Student)** – Bristol, UK

- Developed a mathematical model of the CFMS data-centre cooling system
- Contributed to in-house software tools (Python & C++) for FEM, system modelling, meshing, optimisation, sensitivity analysis, and Quasi-Monte Carlo methods
- Gained experience using a High Performance Computing (HPC) cluster

Software

2023 – Present	**SciPy (Maintainer)**

- Responsible for developing and maintaining one of the largest and most frequently downloaded scientific computing packages for Python
- Author of a number of functions, including `scipy.interpolate.AAA`
- Gained exposure to a wide variety of numerical codes written in a range of programming languages as well as best practices such as unit testing and CI/CD
- Represented SciPy at the 2024 Scientific Python Developer Summit hosted at the eScience Institute, University of Washington

Technical Skills

Programming languages
Proficient in: Python, MATLAB
Familiar with: Julia, C++

Software
LaTeX, Git, Linux, Slurm, Docker, CI/CD

Other Interests

Sailing, sailing coaching, and cycling.