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Career Outline

2019– Professor of Numerical Analysis, University of Edinburgh

1999–2019 Professor of Mathematics, University of Strathclyde

1996–1999 Reader in Applied Mathematics, University of Strathclyde

1990–1996 Lecturer in Numerical Analysis, University of Dundee

1988–1990 Postdoctoral Fellow, University of Toronto

Higher Education

1986–88 Ph.D. (Numerical Analysis), University of Manchester

1985–86 M.Sc. (Numerical Analysis and Computing), University of Manchester

1982–85 B.Sc. First Class Hons. (Mathematics), University of Manchester

Fellowships, Awards and Prizes

2024 Research Fellowship from The Leverhulme Trust

2020 *Shephard Prize* from the London Mathematical Society

2015 EPSRC/RCUK Digital Economy Established Career Fellowship

2013 Royal Society Leverhulme Trust Senior Research Fellowship

2012 Royal Society Wolfson Research Merit Award

2011 Research Fellowship from The Leverhulme Trust

2011 Awarded *1966 Chair of Numerical Analysis* at University of Strathclyde

2009 Elected to an inaugural SIAM Fellowship *for contributions to numerical analysis and stochastic computation*

2008 Arne Magnus Distinguished Lecture Series, Colorado State University

2007 SIGEST article in SIAM Review

2006 Elected *Fellow of the Royal Society of Edinburgh*

2005 *Germund Dahlquist Prize* from the Society for Industrial and Applied Mathematics (SIAM)—an international award made every two years for research contributions in numerical methods for scientific computing

2004 Research Fellowship from The Royal Society of Edinburgh/Scottish Executive Education and Lifelong Learning Department

2002 Research Fellowship from The Leverhulme Trust

Research Interests

Numerical analysis, the design and evaluation of computational methods; especially **stochastic computation**, **network science**, **data analytics**, and their application to *cities*, *on-line technology* and *human behaviour*.

Research Funding: *Large Grants as Principal Investigator:*

2024: £60,000 from The Leverhulme Trust. Personal Research Fellowship for *A Numerical Analysis Treatment of Adversarial Perturbations in AI*.

2022: £71,000 from the Engineering and Physical Sciences Research Council for the project *Disease Spread at High Order*.

2021: £202,000 from the Engineering and Physical Sciences Research Council for the project *Mathematics of Adversarial Attacks* under the New Horizons scheme. Includes funding for a post-doctoral researcher.

2017: €183,000 from European Commission/Horizon 2020. Marie Sklodowska-Curie action, providing two years of support for named postdoctoral researcher Dr Franceso Tudisco on the project *Models and Algorithms for Graph Centrality*.

2015: £660,000 from the Research Councils UK Digital Economy Programme and the Engineering and Physical Sciences Research Council. Established Career Fellowship in *Data Analytics for Future Cities*. Includes funding for a post-doctoral researcher.

2014: £20,000 from Stipso/Encompass. Research exploitation project to fund a post-doctoral worker in infographics.

2014: £60,000 from Capita/Strathclyde Strategic Technology Partnership for a PhD studentship (co-supervised by Kerem Akartunali), on *Networks and Optimization for Future Cities*.

2013: £40,000 from Royal Society/Leverhulme Trust for a Senior Research Fellowship on the project *Evolving Networks: Data to Knowledge*.

2012: £50,000 from Engineering and Physical Sciences Research Council/Strathclyde Impact Acceleration Account/Strathclyde Leadership Development/Bloom Agency, Leeds. Research exploitation project to fund a post-doctoral worker.

2011: £50,000 from Engineering and Physical Sciences Research Council/Strathclyde Knowledge Transfer Account/Beatson Institute for Cancer Research. Research exploitation project to fund a post-doctoral worker.

2011: £30,000 from The Leverhulme Trust. Personal Research Fellowship for the project *Fundamental Issues in Stochastic Simulation for Systems Biology*.

2010: £180,000 from Engineering and Physical Sciences Research Council and the Research Councils UK Digital Economy Programme, support for a post-doctoral research assistant on the project *MOLTEN: Mathematics Of Large Technological Evolving Networks*.

2010: £50,000 from Engineering and Physical Sciences Research Council and Wyeth (now Pfizer) for the nine-month industrial secondment of a post-doctoral researcher in biological networks.

2009: £60,000 from Engineering and Physical Sciences Research Council for a CASE PhD studentship, partnered by NAG, on *Multi-level Monte Carlo for Mathematical Finance*.

2007: £275,000 from the Medical Research Council (Cognitive Systems Foresight Project call), support for a post-doctoral research assistant, equipment and travel on the project *Complex Brain Networks in Health, Development and Disease*.

2007: £350,000 from Engineering and Physical Sciences Research Council (Fundamentals of Complexity Science call), support for a post-doctoral research assistant, PhD studentship, equipment and travel on the project *Theory and Tools for Complex Biological Systems*.

2004: £160,000 from Engineering and Physical Sciences Research Council Life Sciences Interface & Mathematics Programme. Support for a post-doctoral research assistant, equipment and travel on the project *Network Simulations in Bioinformatics*.

2004: £30,000 from The Royal Society of Edinburgh/Scottish Executive Education and Lifelong Learning Department. Personal Research Fellowship for the project *Computational Algorithms for Complex Interactions*.

2003: £50,000 from Strathclyde/Glasgow University Synergy Initiative. PhD studentship in Bioinformatics.

2001: £20,000 from The Leverhulme Trust. Personal Research Fellowship for the project *Mathematical Simulation and Randomness*.

1998: £50,000 from Engineering and Physical Sciences Research Council Mathematics Program. Continued support for a post-doctoral research assistant, equipment and travel on the project *Time-Stepping and Nonlinear Dynamics*.

1996: £70,000 from Engineering and Physical Sciences Research Council Mathematics Programme. Support for a post-doctoral research assistant, equipment and travel on the project *Time-Stepping and Nonlinear Dynamics*.

1995: £30,000 from the Scottish Higher Education Funding Council. Support for a research assistant and equipment to develop a numerical analysis server for the World Wide Web.

1993: £90,000 from Science and Engineering Research Council Mathematics Programme. Support for a post-doctoral research assistant, equipment and travel on the project *Dynamics of Time-Stepping in the Numerical Analysis of Differential Equations*.

Research Funding: *Large Grants as Institutional Lead:*

2017: £690,000 from Engineering and Physical Sciences Research Council. Programme Grant for the project *Inference, Computation and Numerics for Insights into Cities (ICONIC)*. Joint with colleagues at Cambridge, Manchester and Oxford. Includes funding for a post-doctoral researcher. (Total grant £2.9 Million. Overall PI: Mark Girolami, Cambridge.)

Research Funding: *Large Grants as Co-Investigator:*

2011: £150,00 from EPSRC to support the *Scottish Mathematical Sciences Training Centre*.

2007: £20,000 from University of Strathclyde, Research Enhancement Initiatives Award, (joint with Gian-Luca Oppo and Paul Garside) to establish the *Institute of Complex Systems at Strathclyde*.

2006: £120,000 from Dr Hadwen Trust (led by Dr Heidi Johansen-Berg, University of Oxford) for post-doctoral research assistant, equipment and travel on the project *Computational Approach to Analysing Human Brain Networks and their Breakdown in Disease*.

Editorial Work

On the Editorial Board of

Society for Industrial and Applied Mathematics (SIAM) Journal on Matrix Analysis and Applications

Institute of Mathematics and its Applications (IMA) Journal of Numerical Analyisis

From 2016–20023, **Editor-in-Chief** of Society for Industrial and Applied Mathematics (SIAM) Review—this journal is consistently rated first, by impact factor, in applied mathematics. (Previously Section Editor of its Survey and Review section from 2011–2016.) In addition to leading the Editorial Board, scoping the latest developments in applied mathematics and ensuring the quality and balance of material in the journal, this role requires me to write an introduction to the highlighted *SIGEST* article in each issue that summarizes and contextualizes the work, and encourages potential readers.

Also previously on the Editorial Board of

Proceedings of the Royal Society A

Society for Industrial and Applied Mathematics (SIAM) Journal on Scientific Computing

Journal of Complex Networks

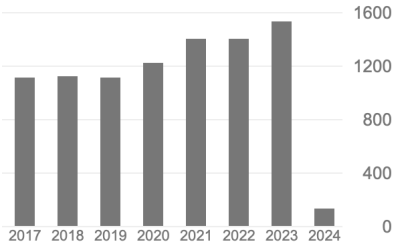
BIT Numerical Mathematics

Journal of Computational Finance

Applied Mathematics Research Express

Co-guest editor for the upcoming special issue of the European Journal of Applied Mathematics on *Adversarial Robustness of AI*.

Citation Record



Google Scholar, January 2024.
Total citations 18,297, H-index 54.
Downloadable list of publications available at
`https://www.maths.ed.ac.uk/~dhigham/pubs.html`

Further Examples of Scientific Leadership

- On the Management Committee of the International Centre for Mathematical Sciences (Edinburgh)
- Member of Newton Gateway to Mathematics Scientific Advisory Panel (Isaac Newton Institute for Mathematical Sciences, Cambridge)
- On the Executive Team of the UK Knowledge Exchange Hub for Mathematical Sciences (KE Hub)
- Mathematical Sciences panel member for the previous UK Research Excellence Framework (REF 2021)
- Member of the Scientific Program Committee for 10th International Congress on Industrial and Applied Mathematics (ICIAM 2023), Tokyo
- Member of the ICIAM Maxwell Prize Committee
- Member of EPSRC Peer Review College since its inception
- Member of London Mathematical Society Prize Committee 2017–2020
- Member of Artificial Intelligence Fellowship sifting panel at Alan Turing Institute 2020
- Member of IMA Leslie Fox Prize Committee 2017–2021
- Member of Royal Society of Edinburgh Research Fellowship Awarding Committee 2015–2020
- Past-President of UK and Ireland Section of SIAM
- Former Deputy Head and Research Director at University of Strathclyde
- Co-organiser of *2017 SIAM Annual Meeting* in Pittsburgh
- Inaugural Faculty Advisor for the Strathclyde SIAM/IMA Student Chapter
- After-dinner speaker at *25th Biennial Conference on Numerical Analysis*, Glasgow, 2013

Recent and Upcoming Invited Talks at Conferences/Workshops with expenses paid

2024 Algorithmic Impact in Artificial Intelligence, Bari

2024 22nd International Conference of Numerical Analysis and Applied Mathematics, Crete, Greece

2024 Stochastic Differential Equations and Machine Learning, Edinburgh

2024 International Workshop on Mathematical Imaging and AI Algorithms (IWMIAA/IPTA 2024), Glasgow

2024 Workshop on Stable Neuromorphic Computation, London

2024 The Fifth Belgrade Bioinformatics Conference, Serbia

2024 Barcelona Supercomputing Center, Severo Ochoa Research Seminar, Barcelona

2024 Edinburgh Mathematical Society Meeting, University of Strathclyde, Glasgow

2023 Curle Lecture at the University of St Andrews

2023 Public lecture at The Mathematics of Random Systems, Edinburgh, also streamed on World Online Seminar on Machine Learning in Finance

2023 21st International Conference of Numerical Analysis and Applied Mathematics, Crete, Greece

2023 NetBio (within 31st Annual Intelligent Systems For Molecular Biology and the 22nd Annual European Conference on Computational Biology), Lyon

2022 Alan Turing Institute Workshop on Trustworthy AI (online)

2022 Theoretical and Computational Aspects of Dynamical Systems, Norway

2022 Advances in Numerical Linear Algebra (Manchester)

2022 Landscape Lecture (Bath)

2022 German Mathematical Society Meeting (Berlin)

2021 2nd International Conference on Trustworthy AI, Skolkovo Inst. Sci. Tech., Moscow (moved online)

2021 Interpretability, safety, and security in AI, Isaac Newton and Turing Institutes, London (online)

2021 LMS/IMA joint meeting on Maths in Human Society (moved online)

2020 1st International Conference on Trustworthy AI, Skolkovo Inst. Sci. Tech., Moscow (moved online)

2020 Stability and Discretization Issues in Differential Equations, Budapest (postponed)

2020 IMA Early Career Mathematicians' Autumn Conference, Glasgow (moved online)

2020 Numerical Analysis and Optimization, Oman

2019 Scientific Computation using Machine-Learning Algorithms, Nottingham

2019 17th International Conference of Numerical Analysis and Applied Mathematics, Rhodes

2019 Stochastic Processes and Applications, Edinburgh

2019 Pint of Science, Glasgow

2019 SIAM UK/Ireland Section Annual Meeting, Oxford

2019 Strathclyde Annual SIAM-IMA Student Chapter Meeting, Glasgow

2019 Dynamics, Equations and Applications, Krakow

2019 Threshold Networks, Nottingham

2019 Bienniel Conference on Numerical Analysis (*A. R. Mitchell Lecture*), Glasgow

2019 Computational Math Day, Stirling

2018 Edinburgh Annual SIAM-IMA Student Chapter Meeting

2018 11th Europe-Korea Conference on Science and Technology 2018, Glasgow

2017 Joint meeting of the Edinburgh Mathematical Society and Societat Catalana de Matemátiques, Edinburgh

2017 Asymptotics for Stochastic Dynamical Systems, Swansea

2017 Industrial Mathematics in the Knowledge Transfer Network, London

2017 Glasgow Philosophical Society Lecture, during Glasow Science Festival

2017 Cafe Scientifique, Glasgow

2016 Mathematics of Complex Systems: from Precision Medicine to Smart Cities, Coimbra

2016 EPSRC meeting on New Approaches to Data Science, London

2016 Mathematical Models and Computational Methods for Complex Networks, Pisa

2016 Stochastic Dynamical Systems, Newton Institute, Cambridge

2016 Mathematics for Future Cities, Edinburgh International Science Festival

2016 Scottish Branch of the Institute for Mathematics and Its Applications Lecture, Glasgow

2015 European Conference on Numerical Mathematics and Advanced Applications (ENUMATH 2015), Ankara

2015 Dynamic Networks and Network Cyber-Security, Heilbronn Institute for Mathematical Research, Bristol

2015 New Directions in Numerical Computation, Oxford

2014 Numerical Algorithms and Intelligent Software, Edinburgh

2014 IMA Conference on the Mathematical Challenges of Big Data, London

2014 Complex Networks: Theory and Applications, Edinburgh

2014 High Dimensionality/Complexity (Final Conference of DFG Priority Programme SPP 1324), Marburg

2014 Twelfth International Conference of Numerical Analysis and Applied Mathematics, Rhodes

2014 Random Dynamics and Stochastic Numerics, Mannheim

2014 Mathematical and Numerical Modeling in Finance, Mittag-Leffler Institute, Stockholm

Ph.D. students Supervised and General Topics

Current Lucas Beerens, *Mathematics of Adversarial Attacks in AI*

2019 Craig Gilmour, *Self-exciting Processes*

2013 Mikolaj Roj, *Multilevel Monte Carlo in Finance*

2011 Xiaolin Xiao, *Complex Brain Networks*

2010 Somkid Intep, *Stochastic Differential Equations with Switching*

2009 Alan Taylor, *Random Networks*

2008 Graeme Chalmers, *Jump-Diffusion Problems in Mathematical Finance*

2006 Julie Morrison, *Graph Computations in Bioinformatics*

2003 Alan Bryden, *Stability Issues in Stochastic Simulation*

2002 Edward McDonald, *Computing Lyapunov Exponents*

1998 Richard Wain, *Dynamics of Adaptive ODE Algorithms*

1997 Abdul-Hadi Alim A. Khader, *Simulating Integro-Differential Equations*

1996 Tasneem Sardar, *Dynamics of Timestepping*

Ph.D. students Co-Supervised and General Topics

Current Alix Leroy, *Adaptive Stochastic Simulation* (jointly supervised by Jonas Latz and Ben Leimkuhler)

2023 Xue Gong, *Higher Order Networks* (jointly supervised by Kostas Zygalakis)

2023 Martin Paton, *Networks and Optimization* (jointly supervised by Kerem Akartunali)

2022 Tadas Krikstanavicius, *Data Assimilation/Active Subspaces* (jointly supervised by Alison Ramage)