

Prof. Desmond J. Higham, FRSE  
Department of Mathematics and Statistics  
University of Strathclyde  
Glasgow, G1 1XH  
Scotland, UK

Email: [d.j.higham@strath.ac.uk](mailto:d.j.higham@strath.ac.uk)  
WWW: <http://personal.strath.ac.uk/d.j.higham>

### **Career Outline**

- 1999–present** 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**

- 2015** EPSRC 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

**2004–2005** Research Fellowship from The Royal Society of Edinburgh/Scottish Executive Education and Lifelong Learning Department

**2002–2004** 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:

**2017:** £690,000 from Engineering and Physical Sciences Research Council. Programme Grant for the project *Inference, Computation and Numerics for Insights into Citiesef (ICONIC)*. Joint with colleagues at Imperial College, University of Manchester and University of Oxford. (Total grant £2.9 Million.) Includes funding for a post-doctoral researcher. *DJH funded at 20% FTE from June 1st, 2017 to May 31st, 2022.*

**2017:** €183,000 from European Commission/Horizon 2020. Marie Skłodowska-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 Engineering and Physical Sciences Research Council. Established Career Fellowship in *Data Analytics for Future Cities*. Includes funding for a post-doctoral researcher. *DJH funded at 70% FTE from Jan 1st, 2015 to Dec 31st, 2019.*

**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 Co-Investigator:**

- 2011:** £150,000 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*.

**Visiting Positions**

**2011** Visiting Professor at the University of Toronto.

**2007 & 2010** Visiting Professor at Colorado State University.

**2003** Visiting Professor at the Centre for Advanced Study, Oslo.

**2002** Visiting Professor at The Fields Institute for Research in Mathematical Sciences, Toronto, Canada.

**1999** Visiting Professor at the Mathematical Sciences Research Institute, Berkeley.

### **Editorial Work**

**Editor-in-Chief** of Society for Industrial and Applied Mathematics (SIAM) Review—this journal is rated first, by impact factor, in applied mathematics. (Also 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.

On the Editorial Board of

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

Journal of Complex Networks

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

Previously on the Editorial Board of

Proceedings of the Royal Society A

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

BIT Numerical Mathematics

Journal of Computational Finance

Applied Mathematics Research Express

Guest editor for the recent SIAM Journal on Scientific Computing special issue on *Planet Earth and Big Data* and the Royal Society Open Science special issue on *City Analytics*.

### **Publication Record**

List of publications available, with most articles downloadable, at

<http://personal.strath.ac.uk/d.j.higham/pubs.html>

Unfiltered Google Scholar, July 2018: total citations 10574, H-index 46.

### **Further Examples of Scientific Leadership**

- Leader of department's Numerical Analysis and Scientific Computing research group (nine permanent academics)

- Member of Turing Gateway to Mathematics Programme Committee
- Member of Knowledge Exchange Advisory Board of the International Centre for Mathematical Sciences, Edinburgh
- Advisory Board member for Institute of Future Cities at Strathclyde
- Advisory Board member for Glasgow's City Observatory
- Member of EPSRC Peer Review College since its inception
- Member of London Mathematical Society Prize Committee
- Member of IMA Leslie Fox Prize Committee
- Co-organiser of *2017 SIAM Annual Meeting* in Pittsburgh
- Co-organiser of three workshops on *City Analytics*: Royal Society of Edinburgh in 2018, Alan Turing Institute in 2017 and Future Cities Catapult in 2015
- Organiser of three workshops on *Big Data and Social Media*: Glasgow, 2017 and 2013, and Edinburgh, 2013
- Co-organiser of one week meeting on *Mathematics for Measurement* at the International Centre for Mathematical Sciences, Edinburgh in 2017
- Co-organiser of workshops on *Network Science meets Matrix Functions* and *Networks: from Matrix Functions to Quantum Physics* in Oxford, 2017 and 2016
- Co-organiser of Scoping workshop on *Urban Analytics* for Alan Turing Institute in 2015
- Co-organiser of a workshop on *What Makes a Successful City?* in Glasgow, 2015
- Co-organiser of a workshop on *Opportunities for Data Analytics in Future Cities Research* in Glasgow, 2014
- Faculty Advisor for the Strathclyde SIAM Student Chapter
- External undergraduate examiner (Part B) in applied mathematics at University of Oxford, 2015–2017
- External referee for the MSc on *Mathematics of Cybersecurity*, University of Bristol
- Past-President of UK and Ireland Section of SIAM, 2015-2017
- After-dinner speaker at *25th Biennial Conference on Numerical Analysis*, Glasgow, 2013

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

**2019** Mathematical Criminology and Security, Banff International Research Station for Mathematical Innovation and Discovery (BIRS)

**2019** SIAM UK/Ireland Section Annual Meeting, Oxford

**2019** Dynamics, Equations and Applications, Krakow

- 2019** Threshold Networks, Nottingham
- 2019** Biennial Conference on Numerical Analysis (*A. R. Mitchell Lecture*), Glasgow
- 2018** Edinburgh SIAM 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 Matemàtiques, Edinburgh
- 2017** Asymptotics for Stochastic Dynamical Systems, Swansea
- 2017** Industrial Mathematics in the Knowledge Transfer Network, London
- 2017** Glasgow Philosophical Society Lecture, during Glasgow 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
- 2013** Computational Linear Algebra and Optimization for the Digital Economy, ICMS, Edinburgh
- 2013** Dynamical Networks: From Data to Models (NetSci Satellite), Copenhagen
- 2013** Optimization and Big Data, ICMS, Edinburgh
- 2013** Large Evolving Networks, Heilbronn Institute, Bristol

- 2013** Numerical Methods for Stochastic Differential Equations, Vienna
- 2013** Information, Probability and Inference in Systems Biology, ICMS, Edinburgh
- 2013** Bifurcation Theory, Numerical Linear Algebra and Applications, Bath
- 2012** SIAM Conference on Applied Linear Algebra, Valencia
- 2012** Networks in the Life Sciences, Reading
- 2012** Computational Stochastics, Annweiler
- 2012** Function Prediction in Complex Networks, Royal Society Kavli Centre, Buckinghamshire
- 2011** South African Symposium on Numerical and Applied Mathematics, Stellenbosch
- 2011** Progress on Difference Equations, Dublin
- 2011** Scientific Computation and Differential Equations, Toronto
- 2011** Stochastic Differential Equations: Numerical Algorithms and Applications, Oxford
- 2011** Workshop on Numerical Linear Algebra, Edinburgh
- 2011** Dagstuhl Seminar on Analysis of Dynamic Social and Technological Networks, Wadern
- 2010** Multi-scale Stochastic Modeling of Cell Dynamics, Banff International Research Station for Mathematical Innovation and Discovery (BIRS)
- 2010** BIT 50: Trends in Numerical Computing, Lundh
- 2010** Scottish Computational Mathematics Symposium, Edinburgh
- 2010** Opening Workshop of 2010–11 Program on Complex Networks, SAMSI, North Carolina

### **Ph.D. students Supervised and General Topics**

- Current** Ahmad Alsayed, *Dynamic Human Interaction Networks*
- Current** Craig Gilmour, *Predictive Policing*
- 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**

**Current** Tadas Krikstanavicius, *Data Assimilation/Active Subspaces* (jointly supervised by Alston Ramage)

**Current** Martin Paton, *Networks and Optimization for Future Cities* (jointly supervised by Kerem Akartunali from the Department of Management Science)

**2014** Martin McDonald *Networks in Neuroscience and Genetics* (Medical Devices Doctoral Training Centre student, co-supervised by neuroscientists Ben Pickard and Judy Pratt at Strathclyde)

**2010** Lukas Szpruch, *Stochastic Differential Equations* (jointly supervised with Xeurong Mao)

**2010** Xu Gu, *Differential Equation Models in Cell Biology* (main supervisor was David Gilbert)