

Alex Bespalov

School of Mathematics
University of Birmingham
Edgbaston, Birmingham B15 2TT
United Kingdom

Phone: + 44 (0) 121 414 6582

E-mail: a.bespalov@bham.ac.uk

Web: <http://web.mat.bham.ac.uk/A.Bespalov/>

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Qualifications

- Postgraduate Certificate in Academic Practice (with distinction), 2016
University of Birmingham, United Kingdom
- Ph.D. in Computational Mathematics, 1999
Institute for Computational Mathematics and Mathematical Geophysics, Russian Academy of Sciences, Siberian Branch (Novosibirsk, Russia)
Ph.D. Thesis: The design and analysis of the h - p version of the finite element method for the Dirichlet problem with singularity of solution
Advisor: Professor V. A. Rukavishnikov
- B.Sc. (with distinction) in Mathematics, 1994
Additional qualification: Teacher of Mathematics and Computer Science
Khabarovsk State Pedagogical University (Khabarovsk, Russia)

Current Employment

- *School of Mathematics, University of Birmingham* (Birmingham, United Kingdom)
Associate Professor in Numerical Analysis (December 2021 – present)
Senior Lecturer in Applied Mathematics (August 2018 – November 2021)
Lecturer in Applied Mathematics (May 2013 – July 2018)

Previous Employment

- *School of Mathematics, University of Manchester* (Manchester, United Kingdom)
Research Associate (August 2010–May 2013)
- *Department of Mathematical Sciences, Brunel University* (Uxbridge, United Kingdom)
Research Fellow (September 2007–August 2010)
- *Computational Center, Russian Academy of Sciences, Far-Eastern Branch*
(Khabarovsk, Russia)
Senior Researcher (2000–2007), Researcher (1999–2000)
- *Department of Mathematical Analysis and Computer Science, Khabarovsk State Pedagogical University* (Khabarovsk, Russia)
Docent (Senior Lecturer) (2002–2003), part-time employment

Visiting Appointments and Awards

- *Erwin Schrödinger International Institute for Mathematics and Physics* (Vienna, Austria)
Programme participant for the thematic programme “Computational uncertainty quantification: mathematical foundations, methodology & data” (May 2022)
- *The Alan Turing Institute* (London, United Kingdom)
Turing Fellow (January 2019–January 2021)
- *Isaac Newton Institute for Mathematical Sciences* (Cambridge, United Kingdom)
Programme participant for the scientific programme “Uncertainty quantification for complex systems: theory and methodologies” (April–May 2018)
- *Institute for Analysis and Scientific Computing, TU Wien* (Vienna, Austria)
Visiting Researcher (March–April 2017); Guest Professor (2018)
- *Facultad de Matemáticas, Universidad Católica* (Santiago, Chile)
Visiting Researcher (March 2009, April 2014)
- *Laboratory of Mathematics and its Applications, Université de Valenciennes* (France)
Visiting Professor (May–June 2013)
- *School of Mathematical Sciences, Brunel University* (Uxbridge, United Kingdom)
Visiting Researcher (June 2005, June 2006)
- *Departamento de Ingeniería Matemática, Universidad de Concepción* (Concepción, Chile)
Visiting Postdoctoral Researcher (June–November 2003)

Brief Summary of Research

- Main research areas: numerical analysis, scientific computing, uncertainty quantification
- Research interests: numerical solution of partial differential and boundary integral equations; numerical methods for PDEs with parametric or uncertain inputs; high order finite element and boundary element methods; adaptive methods; convergence analysis and error estimation; singularities and their approximation; software development; applications to electromagnetics, fluid dynamics, and linear elasticity

List of Publications

Preprints submitted for publication

- [1] A. Bespalov, D. Praetorius and M. Ruggeri, Goal-oriented adaptive multilevel stochastic Galerkin FEM. *Preprint*, arXiv:2208.09388, 2022.

Publications in Refereed Journals

- [2] A. Bespalov and D. Silvester, Error estimation and adaptivity for stochastic collocation finite elements. Part II: multilevel approximation. *SIAM Journal on Scientific Computing*, Vol. 45 (2023), Issue 2, pp. A781–A797.
- [3] A. Bespalov, D. Silvester and F. Xu, Error estimation and adaptivity for stochastic collocation finite elements. Part I: single-level approximation. *SIAM Journal on Scientific Computing*, Vol. 44 (2022), Issue 5, pp. A3393–A3412.

- [4] A. Bespalov, D. Praetorius and M. Ruggeri, Convergence and rate optimality of adaptive multilevel stochastic Galerkin FEM. *IMA Journal of Numerical Analysis*, Vol. 42 (2022), Issue 3, pp. 2190–2213.
- [5] A. Bespalov, D. Praetorius and M. Ruggeri, Two-level a posteriori error estimation for adaptive multilevel stochastic Galerkin FEM. *SIAM/ASA Journal on Uncertainty Quantification*, Vol. 9 (2021), Issue 3, pp. 1184–1216.
- [6] A. Bespalov, D. Loghin and R. Youngnoi, Truncation preconditioners for stochastic Galerkin finite element discretizations. *SIAM Journal on Scientific Computing*, Vol. 43 (2021), Issue 5, pp. S92–S116.
- [7] A. Khan, A. Bespalov, C. E. Powell and D. J. Silvester, Robust a posteriori error estimation for stochastic Galerkin formulations of parameter-dependent linear elasticity equations. *Mathematics of Computation*, Vol. 90 (2021), no. 328, pp. 613–636.
- [8] A. Bespalov, L. Rocchi and D. Silvester, T-IFISS: a toolbox for adaptive FEM computation. *Computers & Mathematics with Applications*, Vol. 81 (2021), pp. 373–390.
- [9] A. Bespalov and F. Xu, A posteriori error estimation and adaptivity in stochastic Galerkin FEM for parametric elliptic PDEs: beyond the affine case. *Computers & Mathematics with Applications*, Vol. 80 (2020), no. 5, pp. 1084–1103.
- [10] A. Bespalov, D. Praetorius, L. Rocchi and M. Ruggeri, Convergence of adaptive stochastic Galerkin FEM. *SIAM Journal on Numerical Analysis*, Vol. 57 (2019), no. 5, pp. 2359–2382.
- [11] A. J. Crowder, C. E. Powell and A. Bespalov, Efficient adaptive multilevel stochastic Galerkin approximation using implicit a posteriori error estimation. *SIAM Journal on Scientific Computing*, Vol. 41 (2019), no. 3, pp. A1681–A1705.
- [12] A. Bespalov, T. Betcke, A. Haberl and D. Praetorius, Adaptive BEM with optimal convergence rates for the Helmholtz equation. *Computer Methods in Applied Mechanics and Engineering*, Vol. 346 (2019), pp. 260–287.
- [13] A. Bespalov, D. Praetorius, L. Rocchi and M. Ruggeri, Goal-oriented error estimation and adaptivity for elliptic PDEs with parametric or uncertain inputs. *Computer Methods in Applied Mechanics and Engineering*, Vol. 345 (2019), pp. 951–982.
- [14] A. Bespalov and L. Rocchi, Efficient adaptive algorithms for parametric PDEs with spatial singularities. *SIAM/ASA Journal on Uncertainty Quantification*, Vol. 6 (2018), no. 1, pp. 243–272.
- [15] A. Bespalov, A. Haberl and D. Praetorius, Adaptive FEM with coarse initial mesh guarantees optimal convergence rates for compactly perturbed elliptic problems. *Computer Methods in Applied Mechanics and Engineering*, Vol. 317 (2017), pp. 318–340.
- [16] A. Bespalov and D. Silvester, Efficient adaptive stochastic Galerkin methods for parametric operator equations. *SIAM Journal on Scientific Computing*, Vol. 38 (2016), Issue 4, pp. A2118–A2140.

- [17] A. Bespalov and S. Nicaise, A priori error analysis of the BEM with graded meshes for the electric field integral equation on polyhedral surfaces. *Computers & Mathematics with Applications*, Vol. 71 (2016), no. 8, pp. 1636–1644.
- [18] A. Bespalov and S. Nicaise, The BEM with graded meshes for the electric field integral equation on polyhedral surfaces. *Numerische Mathematik*, Vol. 132 (2016), no. 4, pp. 631–655.
- [19] A. Bespalov, C. Powell and D. Silvester, Energy norm a posteriori error estimation for parametric operator equations. *SIAM Journal on Scientific Computing*, Vol. 36 (2014), Issue 2, pp. A339–A363.
- [20] A. Bespalov, C. Powell and D. Silvester, A priori error analysis of stochastic Galerkin mixed approximations of elliptic PDEs with random data. *SIAM Journal on Numerical Analysis*, Vol. 50 (2012), Issue 4, pp. 2039–2063.
- [21] D. Silvester, A. Bespalov and C. Powell, A framework for the development of implicit solvers for incompressible flow problems. *Discrete and Continuous Dynamical Systems - Series S*, Vol. 5 (2012), Issue 6, pp. 1195–1221.
- [22] A. Bespalov and N. Heuer, Natural hp -BEM for the electric field integral equation with singular solutions. *Numerical Methods for Partial Differential Equations*, Vol. 28 (2012), Issue 5, pp. 1466–1480.
- [23] A. Bespalov and N. Heuer, A new $\mathbf{H}(\text{div})$ -conforming p -interpolation operator in two dimensions. *ESAIM: Mathematical Modelling and Numerical Analysis*, Vol. 45 (2011), no. 2, pp. 255–275.
- [24] A. Bespalov, N. Heuer and R. Hiptmair, Convergence of the natural hp -BEM for the electric field integral equation on polyhedral surfaces. *SIAM Journal on Numerical Analysis*, Vol. 48 (2010), Issue 4, pp. 1518–1529.
- [25] A. Bespalov and N. Heuer, Natural p -BEM for the electric field integral equation on screens. *IMA Journal of Numerical Analysis*, Vol. 30 (2010), No. 3, pp. 595–628.
- [26] A. Bespalov and N. Heuer, The hp -BEM with quasi-uniform meshes for the electric field integral equation on polyhedral surfaces: a priori error analysis. *Applied Numerical Mathematics*, Vol. 60 (2010), Issue 7, pp. 705–718.
- [27] A. Bespalov and N. Heuer, The hp -version of the boundary element method with quasiuniform meshes for weakly singular operators on surfaces. *IMA Journal of Numerical Analysis*, Vol. 30 (2010), No. 2, pp. 377–400.
- [28] A. Bespalov and N. Heuer, Optimal error estimation for $\mathbf{H}(\text{curl})$ -conforming p -interpolation in two dimensions. *SIAM Journal on Numerical Analysis*, Vol. 47 (2009), Issue 5, pp. 3977–3989.

- [29] A. Beshpalov, A note on the polynomial approximation of vertex singularities in boundary element methods in three dimensions. *Journal of Integral Equations and Applications*, Vol. 21 (2009), No. 3, pp. 359–380.
- [30] A. Beshpalov and N. Heuer, The hp -version of the boundary element method with quasiuniform meshes in three dimensions. *ESAIM: Mathematical Modelling and Numerical Analysis*, Vol. 42 (2008), Issue 5, pp. 821–849.
- [31] A. Beshpalov, The hp -version of the BEM with quasi-uniform meshes for a three-dimensional crack problem: the case of a smooth crack having smooth boundary curve. *Numerical Methods for Partial Differential Equations*, Vol. 24 (2008), Issue 4, pp. 1159–1180.
- [32] A. Beshpalov and N. Heuer, The p -version of the boundary element method for weakly singular operators on piecewise plane open surfaces. *Numerische Mathematik*, Vol. 106 (2007), No. 1, pp. 69–97.
- [33] D. Arroyo, A. Beshpalov and N. Heuer, On the finite element method for elliptic problems with degenerated and singular coefficients. *Mathematics of Computation*, Vol. 76 (2007), no. 258, pp. 509–537.
- [34] A. Beshpalov and N. Heuer, The p -version of the boundary element method for a three-dimensional crack problem. *Journal of Integral Equations and Applications*, Vol. 17 (2005), No. 3, pp. 243–258.
- [35] A. Beshpalov and N. Heuer, The p -version of the boundary element method for hypersingular operators on piecewise plane open surfaces. *Numerische Mathematik*, Vol. 100 (2005), No. 2, pp. 185–209.
- [36] A. Beshpalov, Orthogonal systems of singular functions and numerical treatment of problems with degeneration of data. *Advances in Computational Mathematics*, Vol. 19 (2003), pp. 159–182.
- [37] A. Yu. Beshpalov and V. A. Rukavishnikov, The use of singular functions in the h - p version of the finite element method for the Dirichlet problem with degeneration of input data. *Siberian Journal of Numerical Mathematics*, Vol. 4 (2001), no. 3, pp. 201–228.
- [38] A. Yu. Beshpalov and V. A. Rukavishnikov, The exponential rate of convergence of the finite element method for the Dirichlet problem with singularity of the solution. *Dokl. Russ. Acad. Nauk*, Vol. 374 (2000), no. 6, pp. 727–731. English translation in: *Russian Acad. Sci. Doklady Mathematics*, Vol. 62 (2000), no. 2, pp. 266–270.
- [39] V. A. Rukavishnikov and A. Yu. Beshpalov, On the h - p version of the finite element method for one-dimensional boundary value problem with singularity of solution. *Siberian Journal of Numerical Mathematics*, Vol. 1 (1998), no. 2, pp. 153–170.

Publications in refereed conference proceedings

- [40] A. Bespalov and N. Heuer, High-order boundary element method for electromagnetic scattering at non-smooth surfaces. In: “*Proceedings of the 10-th International Conference on the Mathematical and Numerical Aspects of Waves; Vancouver, Canada, July 25–29, 2011*”, ed. by N. Nigam, Pacific Institute for the Mathematical Sciences, Canada, 2011, pp. 121–124.
- [41] A. Bespalov and N. Heuer, The p -version of the boundary element method for mixed boundary value problems on polyhedra. In: “*Advances in Boundary Integral Methods, Proceedings of the 5th UK Conference on Boundary Integral Methods*”, ed. by K. Chen, University of Liverpool, UK, 2005, pp. 145–152.
- [42] A. Bespalov and N. Heuer, Optimal a priori error estimate for the p -version of the BEM on open surfaces. In: “*Proceedings of the International Conference on Computational Mathematics, ICCM-2004. Part II*”, ed. by G. A. Mikhailov, V. P. Il’in and Y. M. Laevsky, ICM&MG Publishers, Novosibirsk, Russia, 2004, pp. 794–799.
- [43] A. Yu. Bespalov and V. A. Rukavishnikov, An exponential rate of convergence of the finite element method for the Dirichlet problem with singularity of a solution. In: “*ENUMATH-99. Proceedings of the Third European Conference on Numerical Mathematics and Advanced Applications, Jyvaskyla, Finland, July 26–30, 1999*”, ed. by P. Neittaanmaki, T. Tiihonen and P. Tarvainen, World Scientific, Singapore, 2000, pp. 681–689.
- [44] A. Yu. Bespalov and V. A. Rukavishnikov, On the h - p version of the finite element method using singular functions. In: “*The Far-Eastern School-Seminar on Mathematical Modeling and Numerical Analysis. The Proceedings & Abstracts*”, ed. by V. A. Rukavishnikov, Khabarovsk, 1999, pp. 6–13.

Research Software

- D. Silvester, A. Bespalov, Q. Liao and L. Rocchi, *Triangular IFISS (T-IFISS)*, version 1.2, February 2019. Available online at <https://www.manchester.ac.uk/ifiss/tifiss.html>
- A. Bespalov and L. Rocchi, *Stochastic T-IFISS*, January 2022. Available online at https://github.com/albespalov/Stochastic_T-IFISS
- A. Bespalov, D. Silvester, and F. Xu, *Adaptive ML-SCFEM*, January 2023. Available online at https://github.com/albespalov/Adaptive_ML-SCFEM
- D. Silvester, A. Bespalov and C. Powell, *Stochastic IFISS (S-IFISS)*, version 1.04, October 2017. Available online at <https://www.manchester.ac.uk/ifiss/sifiss.html>

Research Funding

- *Engineering and Physical Sciences Research Council (EPSRC)* Mathematical Sciences Small Grant, 2021–2022.
Project title: Adaptive multilevel stochastic collocation methods for uncertainty quantification (Ref. EP/W010925/1).
Role: principal investigator. **Value:** £56,461.

- *Engineering and Physical Sciences Research Council (EPSRC)*
Standard research grant, 2017–2021.
Project title: Numerical analysis of adaptive UQ algorithms for PDEs with random inputs (Ref. EP/P013791/1).
Role: principal investigator. **Value:** £329,468.
- *Birmingham–Nottingham Strategic Collaboration Fund*
Grant to initiate collaborative research, 2018–2019.
Project title: New solution paradigms for high-dimensional mathematical models using machine-learning algorithms (Ref. FRM279848).
Role: principal investigator (joint). **Value:** £4,840.
- *The Institute of Mathematics and its Applications (IMA)*
Travel grant (IMA Small grant scheme) to attend the SIAM Conference on Uncertainty Quantification at EPFL in Lausanne, Switzerland, 2016.
Role: grant holder. **Value:** £600.
- *London Mathematical Society*
Conference Grant (Scheme 1) to organise the workshop “Adaptive algorithms for computational PDEs”, 2015.
Role: grant holder. **Value:** £4,720.
- *European Union – INTAS*
Grant for Young Scientists in the category Post Doctoral Fellowship; 2007–2008.
Project title: Efficient boundary element approximations of time-harmonic electromagnetic waves with singularities (Ref. 06-1000014-5945).
Role: fellowship holder and principal investigator. **Value:** €21,400.
- *Russian Science Support Foundation*
Research Fellowship; 2006-2007.
Role: fellowship holder. **Value:** \$6,000.
- *Russian Foundation for Basic Research*
Grant for young scientists and post-graduate students (Ref. 02-01-06291) within the project “Numerical analysis methods for boundary value problems with strong singularities and applications”; 2002.
Role: principal investigator. **Value:** \$1,000.
- *Russian Foundation for Basic Research*
Individual travel grants to attend international conferences: Pohang, Korea (2001); Toronto, Canada (2002); Uxbridge, UK (2006); Beijing, China (2007).
Role: grant holder.

Research Communications

Invited talks / participation supported by organisers

- 29th Biennial Numerical Analysis Conference (Glasgow, UK; June 2023). Invited mini-symposium talk: “*Approximating nonlinear quantities of interest using adaptive multilevel stochastic Galerkin FEM*”.

- CMAM 2022, Computational Methods in Applied Mathematics (Vienna, Austria; August 2022). Invited mini-symposium talk: “*Adaptive multilevel stochastic collocation FEM for parametric PDEs*”.
- Workshop “Interplay of discretization and algebraic solvers: a posteriori error estimates and adaptivity” (INRIA Paris, France; June, 2022). Invited talk: “*Adaptive multilevel stochastic Galerkin FEM for parametric PDE problems*”. All expenses paid by the organisers.
- Workshop “Approximation of high-dimensional parametric PDEs in forward UQ” (Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria; May, 2022). Invited talk: “*Multilevel and goal-oriented adaptivity for stochastic Galerkin FEM*”. Local expenses paid by the organisers.
- Workshop “Adaptivity, high dimensionality and randomness” (Erwin Schrödinger International Institute for Mathematics and Physics, Vienna, Austria; April, 2022). Invited talk: “*A posteriori error estimation and adaptivity for stochastic collocation FEM*”. Local expenses paid by the organisers.
- Workshop “Numerical Analysis of Stochastic PDEs” (Centre International de Rencontres Mathématiques, Marseille, France; November, 2021). Invited talk: “*Multilevel adaptivity in stochastic Galerkin FEM*”. The talk was delivered online.
- Minisymposium in memory of Francisco-Javier Sayas within the XXVI-th Congress of Differential Equations and Applications / XVI-th Congress of Applied Mathematics (Polytechnic School of Engineering of Gijón, Spain; June 2021). Invited talk: “*Raviart–Thomas interpolation on anisotropic elements with application to the BEM for Maxwell’s equations*”. The talk was delivered online.
- FoCM 2020, Foundations of Computational Mathematics (SFU, Vancouver, Canada; June 2020). Invited to speak at the Workshop “Multiresolution and Adaptivity in Numerical PDEs”. Cancelled due to the COVID-19 pandemic.
- RMMM 2019, Reliable Methods of Mathematical Modeling (TU Wien, Austria; September 2019). Invited talk: “*Convergence analysis of adaptive stochastic Galerkin FEM*”. All expenses paid by the organisers.
- MAFELAP 2019, Mathematics of Finite Elements and Applications (Uxbridge, UK; June 2019). Invited mini-symposium talk: “*Goal-oriented adaptivity for elliptic PDEs with parametric or uncertain inputs*”.
- 27th Biennial Numerical Analysis Conference (Glasgow, UK; June 2017). Invited mini-symposium talk: “*On the design and performance of adaptive stochastic Galerkin methods*”.
- SIAM Conference on Uncertainty Quantification (EPFL, Lausanne, Switzerland; April 2016). Invited mini-symposium talk: “*Adaptive algorithms driven by a posteriori estimates of error reduction for PDEs with random data*”.
- British Computational PDEs Colloquium: New Trends (International Centre for Mathematical Sciences, Edinburgh, UK; January, 2014). Invited talk: “*A posteriori error estimation for stochastic Galerkin approximations*”. All expenses paid by the organisers.
- MAFELAP 2013, Mathematics of Finite Elements and Applications (Uxbridge, UK; June 2013). Invited mini-symposium talk: “*A posteriori error estimation for stochastic Galerkin FEMs*”.

- Workshop “Numerical Analysis of Stochastic PDEs” (Mathematics Institute, University of Warwick, UK; June, 2012). Invited talk: “*Stochastic Galerkin finite element methods for saddle point problems with random data*”. All local expenses paid by the organisers.
- Workshop “High-Order Numerical Approximation for Partial Differential Equations” (Hausdorff Center for Mathematics, Bonn, Germany; February 2012). Invited talk: “*A priori error analysis of stochastic Galerkin mixed finite element methods*”. All local expenses paid by the organisers.
- Workshop “Linear algebra aspects of solving PDEs with random data” (Manchester, UK; January 2012). Invited talk: “*Numerical analysis of saddle point problems with random data*”.
- MAFELAP 2009, Mathematics of Finite Elements and Applications (Uxbridge, UK; June 2009). Invited mini-symposium talks: “*On the convergence analysis of high-order BEM for electro-magnetic scattering in three dimensions*” and “*Approximations of singularities by boundary element methods*”.
- ICOSAHOM-07, International Conference on Spectral and High Order Methods (Beijing, China; June 2007). Invited mini-symposium talk: “*On the error analysis of the high order boundary element methods in three dimensions*”. All local expenses paid by the organisers.
- MAFELAP 2006, Mathematics of Finite Elements and Applications (Uxbridge, UK; June 2006). Invited mini-symposium talk: “*On the hp-version of the boundary element method with quasi-uniform meshes in three dimensions*”. Registration fee waived by the organisers.
- BICOM Workshop on Boundary Elements (Uxbridge, UK; June 2005). Contributed talk: “*The p-version of the boundary element method for hypersingular operators*”. All local expenses paid by the organisers.
- COMCA 2003, XIII Congreso de Matemáticas Capricornio (Antofagasta, Chile; August 2003). Invited mini-symposium talk: “*On the p-version of the finite element method for boundary value problems with strongly singular solutions*”.

Research seminars

22 invited seminar talks, including those at

- Irish Numerical Analysis Forum (online; January 2023)
- Bath Numerical Analysis Seminar, Department of Mathematical Sciences, University of Bath, UK (November 2021)
- School of Mathematics, Cardiff University, UK (October 2016)
- Department of Mathematics, University of Sussex, Brighton, UK (February 2015).
- Facultad de Matemáticas, Universidad Católica, Santiago, Chile (April 2014)
- Laboratory of Mathematics and its Applications, Université de Valenciennes, Valenciennes, France (May 2013)
- Department of Mathematics and Statistics, University of Strathclyde, UK (November 2012)
- Department of Mathematical Sciences, Brunel University, UK (October 2012, May 2021).
- Mathematics Institute, University of Warwick, UK (March 2012)

- School of Mathematics, University of Manchester, UK (October 2010).
- Departamento de Ingeniería Matemática, Universidad de Concepción, Chile (July, November 2003).

Contributed talks

17 contributed talks at conferences and workshops, including

- Chemnitz FEM Symposia (Strobl, 2017; Chemnitz, 2018; Herrsching am Ammersee, 2022).
- European Finite Element Fairs (Coventry, 2010 and Milan, 2017).
- Biennial Numerical Analysis Conferences (Glasgow, 2009, 2011, 2015, 2019).
- International Congress on Industrial and Applied Mathematics, ICIAM (Vancouver, 2011).
- WAVES 2011, 10-th International Conference on Mathematical and Numerical Aspects of Waves (Vancouver, 2011).
- UK Conference on Boundary Integral Methods (Durham, September 2007).
- IMACS Workshop on Adaptive Methods for Partial Differential Equations (Toronto, 2002).
- Com2MaC Conference on Computational Mathematics (Pohang, 2001).

Research Supervision

- Dr Feng Xu (Research Fellow; 2017–2020).
- Dr Rawin Youngnoi (PhD student; 2016–2021), jointly supervised with Dr Daniel Loghin.
PhD Thesis: *“Preconditioning techniques for elliptic partial differential equations with random data”*.
- Dr Leonardo Rocchi (PhD student; 2015–19).
PhD Thesis: *“Adaptive algorithms for partial differential equations with parametric uncertainty”*.
- Mr Thomas Round (current PhD student; since September 2019).
Project title: *“Adaptive algorithms for PDE problems with random inputs”*.
- Mr Andrey Savinov (current PhD student; since September 2022).
Project title: *“Design and analysis of adaptive stochastic collocation finite element methods”*.
- Mr Jingye Li (current PhD student; since January 2023), jointly supervised with Professor Jinglai Li.
Project title: *“Machine-learning techniques for PDE-based reliability analysis problems”*.
- Mr Adam Hayes (MSci project in Mathematics; 2021–22).
MSci Thesis: *“Solving differential equations using neural networks”*.
- Mr Oliver Hedges (MSci project in Mathematics; 2020–21).
MSci Thesis: *“Function approximations with feedforward neural networks”*.

- Mr Ryan Sephton (MSc project in Financial Engineering, 2020).
MSc Thesis: “*Deep artificial neural networks for high-dimensional option pricing*”.
- Mr Matthew Williams (MSci project in Mathematics; 2014–15).
MSci Thesis: “*Stochastic sampling methods for PDEs with random input data*”.

Teaching Experience

School of Mathematics, University of Birmingham, 2013–present

Courses taught:

Numerical Methods and Numerical Linear Algebra (Year 3/4)

Numerical Methods II (Year 3/4)

Advanced Numerical Methods (Year 4/PGT)

Computational Methods and Frontiers (Year 4/PGT)

Computational Methods and Programming (PGT)

School of Mathematics, University of Manchester, 2010–12

Course taught: service course Engineering Mathematics (Linear Algebra sub-module) for Year 2 Electrical and Electronic Engineering students.

Department of Mathematical Analysis and Computer Science, Khabarovsk State Pedagogical University (Khabarovsk, Russia), 2002–03

Course taught: Mathematical Analysis for 2nd year undergraduate students.

Meeting / Mini-Symposia Organisation

- **Scientific computation using machine-learning algorithms**
A two-day workshop at the University of Nottingham (April 2019);
jointly organised with Daniel Loghin and Kris van der Zee.
- **Adaptive algorithms for computational PDEs**
A two-day LMS funded workshop at the University of Birmingham (January 2016);
jointly organised with Daniel Loghin.
- **Recent advances in computational PDEs for uncertainty quantification**
A mini-symposium at the 29th Biennial Numerical Analysis Conference (Glasgow; June 2023);
jointly organised with Michele Ruggeri (University of Strathclyde).
- **Finite element methods for efficient uncertainty quantification**
A mini-symposium at the International Conference on Mathematics of Finite Elements and Applications, MAFELAP 2019 (Uxbridge, UK);
jointly organised with David Silvester (University of Manchester).
- **Finite elements for problems with singularities**
A mini-symposium at the International Conference on Mathematics of Finite Elements and Applications, MAFELAP 2013 (Uxbridge, UK);
jointly organised with Serge Nicaise (Université de Valenciennes).

Other Professional and Administrative Experience

- Examiner for PhD Theses:
Mr Matthew J. Parkinson, University of Bath, 2018 (external examiner)
Mr Alexander Haberl, TU Wien (Vienna, Austria), 2018 (external reviewer);
Ms Manal AlQhtani, University of Birmingham, 2017 (internal examiner)
- Referee for
SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing,
SIAM/ASA Journal on Uncertainty Quantification, IMA Journal of Numerical Analysis,
Journal of Scientific Computing, Applied Numerical Mathematics,
Numerical Methods for PDEs, BIT Numerical Mathematics, Numerical Algorithms,
ESAIM: Mathematical Modelling and Numerical Analysis,
Computers and Mathematics with Applications,
Mathematical Methods in the Applied Sciences,
Computational Methods in Applied Mathematics
- Reviewer for Mathematical Reviews (since 2008)
- Member of the Local Scientific Committee for the 25th UKACM Conference on Computational Mechanics, University of Birmingham, 2017
- Head of the Optimisation and Numerical Analysis research group, School of Mathematics, University of Birmingham (since January 2023)
- PGR Recruitment Lead for the Applied Mathematics group, School of Mathematics, University of Birmingham (2021–2022)
- Head of the Applied Mathematics group, School of Mathematics, University of Birmingham (2018–2021)
- Deputy Director of Year 1 Undergraduate Programmes in Mathematics, School of Mathematics, University of Birmingham (2015–17)
- Applied Mathematics seminar organiser (joint), School of Mathematics, University of Birmingham (2013–15)
- Numerical Analysis seminar organiser, School of Mathematics, University of Manchester (2010–12)
- Fellow of the Higher Education Academy, UK (awarded in March 2016)