Kirk M. Soodhalter

Ussher Assistant Professor

	Professional Experience
Since 9/2017	Ussher Assistant Professor in Numerical Analysis , <i>Trinity College Dublin</i> , The University of Dublin, Ireland
6/2016 - 6/2017	Research Scientist, Johann Radon Institute for Computational and Applied Mathematics, Linz, Austria
6/2012 - 6/2016	Universitätsassistent (Assistant Professor) , Industrial Mathematics Institute, Johannes Kepler University, Linz, Austria
1/2012 - 8/2012	Dissertation Completion Fellowship, Temple University, Philadelphia, PA
9/2011 - 12/2011	Teaching Assistantship, Temple University Department of Mathematics, Philadelphia, PA
5/2011 - 8/2011	Graduate Research Internship (Mentor: Michael Parks) , Computer Science Research Institute, Sandia National Laboratory, Albuquerque, NM
5/2008 - 5/2011	Research Assistantship (Advisor: Daniel B. Szyld) , <i>Temple University Department of Mathematics</i> , Philadelphia, PA
5/2004 - 7/2006	Technical Writer and Editor , University of Texas Health Science Center Department of Cardiothoracic and Vascular Surgery, Houston, TX
	Education
5/2012	Ph.D., Mathematics , <i>Temple University</i> , <i>Philadelphia</i> , Title of dissertation: <i>Krylov Subspace Methods with Fixed Memory Requirements: Nearly Hermitian Linear Systems and Subspace Recycling</i> (Supervisor: Prof. Daniel B. Szyld)
5/2010	Master of Arts, Mathematics, Temple University, Philadelphia
5/2004	Bachelor of Science (Magna cum laude), Mathematics and English Literature , <i>Tulane University, New Orleans</i> , Thesis title: <i>An analysis of the Landen transformation</i> (supervisor: Prof. Victor H. Moll)

Language Skills

English Native language

German Written & oral fluency, (and working knowledge of Upper Austria dialect)

Spanish Good knowledge

Journal Publications

- [1] Sudipta Lal Basu et al. "Flow in a large wind field with multiple actuators in the presence of constant vorticity". In: *Physics of Fluids* 34.10 (Oct. 2022), p. 103603.
- [2] Conor Brennan et al. "Computation of scattering from rough surfaces using successive symmetric over relaxation and eigenvalue deflation". In: 2022 16th European Conference on Antennas and Propagation (EuCAP). IEEE. 2022, pp. 1–5.
- [3] Fabian Hinterer et al. "A projected Nesterov-Kaczmarz approach to stellar population-kinematic distribution reconstruction in Extragalactic Archaeology". In: *SIAM Journal on Imaging Sciences* (2022). Accepted for Publication; Preprint: https://arxiv.org/abs/2206.03925.

- [4] Kirk M. Soodhalter. "A note on augmented unprojected Krylov subspace methods". In: *ETNA Electronic Transactions on Numerical Analysis* 55 (2022), pp. 532–546.
- [5] Laura Dykes et al. "Lanczos-based fast blind deconvolution methods". In: *Journal of Computational and Applied Mathematics* 382 (2021), p. 113067.
- [6] Ronny Ramlau et al. "Subspace Recycling-Based Regularization Methods". In: SIAM Journal on Matrix Analysis and Applications 42.4 (2021), pp. 1480-1505.
- [7] Barbara Barabasz et al. "Error Analysis and Improving the Accuracy of Winograd Convolution for Deep Neural Networks". In: *ACM Trans. Math. Softw.* 46.4 (Nov. 2020).
- [8] Marie Kubínová and Kirk M. Soodhalter. "Admissible and Attainable Convergence Behavior of Block Arnoldi and GMRES". In: *SIAM Journal on Matrix Analysis and Applications* 41.2 (2020), pp. 464–486.
- [9] Kirk M. Soodhalter et al. "A survey of subspace recycling iterative methods". In: *GAMM-Mitteilungen* 43.4 (2020), e202000016.
- [10] Roland Herzog and Kirk M. Soodhalter. "A Modified Implementation of MINRES to Monitor Residual Subvector Norms for Block Systems". In: SIAM Journal on Scientific Computing 39.6 (2017), A2645–A2663.
- [11] Jenny Niebsch et al. "Solution of coupled differential equations arising from imbalance problems". In: Electronic Transactions on Numerical Analysis 46 (2017), pp. 89–106.
- [12] Kirk M. Soodhalter. "Stagnation of block GMRES and its relationship to block FOM". In: Electronic Transactions on Numerical Analysis 46 (2017), pp. 162–189.
- [13] Kirk M. Soodhalter. "Block Krylov Subspace Recycling for Shifted Systems with Unrelated Right-Hand Sides". In: SIAM Journal on Scientific Computing 38.1 (2016), A302–A324.
- [14] Kirk M. Soodhalter. "Two recursive GMRES-type methods for shifted linear systems with general preconditioning". In: *Electronic Transactions on Numerical Analysis*) 45 (Mar. 2016), pp. 499–523.
- [15] Kirk Soodhalter. "A block MINRES algorithm based on the banded Lanczos method". English. In: Numerical Algorithms 69 (3 2015), pp. 473–494.
- [16] Kirk M. Soodhalter et al. "Krylov subspace recycling for sequences of shifted linear systems". In: Applied Numerical Mathematics 81C (2014), pp. 105–118.
- [17] Mark Embree et al. "Short-Term Recurrence Krylov Subspace Methods for Nearly Hermitian Matrices". In: SIAM. J. Matrix Anal. and Appl. 33-2 (2012), pp. 480–500.
- [18] Victor H. Moll et al. "The action of Hecke operators on hypergeometric functions". In: J. Aust. Math. Soc. 89.1 (2010), pp. 51–74.

Preprints/Technical Reports

- [19] Liam Burke and Kirk M. Soodhalter. Augmented unprojected Krylov subspace methods from an alternative view of an existing framework. 2022. URL: https://arxiv.org/abs/2206.12315.
- [20] Liam Burke et al. *Krylov subspace recycling for matrix functions*. Submitted to Journal. 2022.
- [21] Siobhán Correnty et al. Preconditioned infinite GMRES for parameterized linear systems. Revisions with Journal. 2022. URL: https://arxiv.org/abs/2206.05153.
- [22] Kirk M. Soodhalter et al. Fast solution of Sylvester-structured systems for spatial source separation of the Cosmic Microwave Background. Revisions with Journal. 2022. URL: https://arxiv.org/abs/ 2204.08057.
- [23] Sudipta Basu et al. "A Decomposed Immersed Interface Method for Simulating a Large Wind Field with An Actuator Disc". Submitted to Journal. 2021.
- [24] Peter Hamberger et al. *Fast computation of the magnetization of an air-gapped transformer using a boundary element method.* Tech. rep. Private/Industrial, 2018.

- [25] Michael L. Parks et al. A block Recycled GMRES method with investigations into aspects of solver performance. Tech. rep. arXiv preprint: https://arxiv.org/abs/1604.01713.2016.
- [26] Meredith Hegg et al. Automatic Detection of Weather Fronts. Tech. rep. 2013.

• Manuscripts in preparation

- [27] Roland Herzog and Kirk M. Soodhalter. "Revisiting GMRES from the Hilbert space perspective (working title)".
- [28] Kirk M. Soodhalter. "Augmented Arnoldi-Tikhonov methods (working title)".
- [29] Erin Claire Carson et al. "Strategies for choosing accuracy for coarse grid solvers in the multigrid V-cycle method". 2022.
- [30] E. de Sturler and Kirk M. Soodhalter. "A unifying framework for recycling-based iterative methods (working title)". 2022.

Software (available at website)

- [31] Kirk M. Soodhalter. kirkmsoodhalter/r3gmres-simplified: R3GMRES Simplified Implementation. https://zenodo.org/record/4975990.2021.
- [32] Roland Herzog and Kirk M. Soodhalter. SUBMINRES. A modified implementation of MINRES to monitor residual subvector norms for block systems. Mar. 2016.
- [33] Michael L. Parks et al. Block GCRO-DR: A version of the recycled GMRES method using block Krylov subspaces and harmonic Ritz vectors. Apr. 2016.
- [34] Kirk M. Soodhalter. Shift Block Recycled GMRES: A Sylvester equation based minimum residual Krylov subspace method for solving multiple shifted systems. May 2016.
- [35] Kirk M. Soodhalter. Recursive recycled GMRES methods for shifted systems with preconditioning. 2015.
- [36] Kirk M. Soodhalter. Block MINRES based on Banded Lanczos. 2014.
- [37] Kirk M. Soodhalter et al. Recycled GMRES for Shifted Linear Systems. 2014.
- [38] Josef Sifuentes and Kirk M. Soodhalter. *Schur Complement Method (for nearly-Hermitian linear systems).* 2010.

Funding obtained

- 2022 Prendergast Challenge-Based Award, Life in the Currents, TCD, Dublin, Budget: €600000 Multidisciplinary grant with Profs. Biswajit Basu, Poul Holm, Francis Ludlow, Iris Moeller, Nessa O'Connor, Margaret Jackson, and John Dingliana
 2020 Visiting Preference Fund Awarded to feaulty to invite visiting preference for short term visit TCD. Dublin
- Visiting Professors Fund, Awarded to faculty to invite visiting professor for short-term visit, TCD, Dublin, Budget: €500
- ______ Laidlaw Undergraduate Research and Leadership Programme, Dublin, Ireland., Budget: € 700
- ______ **Provost's Ph.D. Project Award**, *Awarded to PIs for hiring a Ph.D. student*, TCD, Dublin, Budget: €64000
 - _____ EPSRC: Research in Groups, supporting collaboration of Jennifer Pestana and Gabriel Barrenechea of Strathclyde University with KMS, Edinburgh, Budget: £3000
- _______ Laidlaw Undergraduate Research and Leadership Programme, Dublin, Ireland., Budget: € 700
- ______ Hamilton Mathematics Institute Workshop funding, Dublin, Ireland., Budget: € 12000
- ______ Hamilton Mathematics Institute Workshop funding, Dublin, Ireland., Budget: € 6000
- 2018 Hamilton Trust Summer Mathematics Internship Programme, Dublin, Ireland., Budget: € 10000

2019	Hamilton Trust Summer Mathematics Internship Programme, Dublin, Ireland., Budget: € 10000
2020	_ Hamilton Trust Summer Mathematics Internship Programme, Dublin, Ireland., Budget: € 10000
2021	_ Hamilton Trust Summer Mathematics Internship Programme, Dublin, Ireland., Budget: € 10000
2022	Hamilton Trust Summer Mathematics Internship Programme, Dublin, Ireland., Budget: € 12000
	Presentations
	Plenary talks
9/2022	A unifying framework for recycling-based iterative methods, GAMM Applied and Numerical Linear Algebra Workshop, Prague, Czech Republic
1/2019	Augmented Arnoldi-Tikhonov Methods for III-posed Problems, SIAM UKIE Annual Meeting, Oxford, England
	Workshop talks
8/2022	Analysis of block GMRES using a *-algebra-based approach, Numerical Challenges in Lattice QCD 2022, Meinerzhagen, Germany
10/2019	Case study: projection methods for ill-posed problems – the Arnoldi-Tikhonov method, ROM- SOC – Workshop in Industrial Mathematics, Strobl, Austria
10/2019	Prescribing convergence behavior for block GMRES and block Arnoldi, ROMSOC – Workshop in Industrial Mathematics, Strobl, Austria
6/2019	Describing and prescribing convergence behavior for block GMRES, HMI Workshop: Beyond the discrete: iterative methods from a continuous perpective, Dublin, Ireland
10/2016	Stagnation of Block GMRES and Its Relationship to Block FOM, CIRM Conference on Numerical Linear Algebra and Applications, Marseille, France
3/2016	 Finding Tensor Structure in an III-Posed Problem, RADON Institute "Inverse Problems in the ALPS" Workshop, Obergurgel, Austria
6/2014	Minimum Residual Methods for Shifted Linear Systems with General Preconditioning, House- holder Symposium, Spa, Belgium
9/2012	GMRES with Subspace Recycling for Shifted Linear Systems, Doktorkolleg Workshop, Strobl, Austria
6/2011	The Schur Complement Method for Nearly-Hermitian Linear Systems: An Effective Solver, <i>Householder Symposium</i> , Tahoe City, CA
_ /	Minisymposium talks
7/2022	A unifying framework for recycling-based iterative methods, 27th International Conference on Domain Decomposition Methods, Prague, Czech Republic
6/2022	Analysis of block GMRES using a *-algebra-based approach, 24th Conference of the International Linear Algebra Society, Galway, Ireland
6/2022	A unifying framework for recycling-based iterative methods, <i>Householder Symposium XXI</i> , Selva di Fasano, Italy
5/2021	Using a *-Algebra Interpretation to Describe Convergence of Block GMRES, SIAM ALA, New Orleans, USA (Online)
3/2021	An Augmented Steepest Descent Method for Linear III-Posed Problems , <i>SIAM CSE 2021</i> , Dallas, USA (Online)
3/2021	Prescribing convergence behavior of block GMRES and block Arnoldi, GAMM Annual Meeting 2021, Kassel, Germany (Online)
7/2019	Lanczos-based blind deconvolution methods, ICIAM, Valencia, Spain

7/2019	Augmentation of iterative methods for ill-posed problems, ICIAM, Valencia, Spain
6/2018	Augmented Krylov subspace methods for ill-posed problems, SIAM Imaging, Bologna, Italy
6/2017	A Krylov subspace-based blind deconvolution method, Applied Inverse Problems, Hangzhou, China
10/2015	Iterative Methods for Solving Shifted Linear Systems Built Upon a Block Matrix-vector Product, SIAM Applied Linear Algebra Meeting, Atlanta, USA
8/2015	A pseudo-block Krylov subspace recycling approach for solving many shifted systems with arbitrary right-hand sides, The 8th International Congress on Industrial and Applied Mathematics, Beijing, China
9/2013	Krylov Subspace Recycling: A Direct Projection Method for Solving Shifted Linear Systems, IFIP TC7 Conference on System Modelling and Optimization, Klagenfurt, Austria
6/2012	Krylov subspace recycling for families of shifted linear systems, SIAM Conference on Applied Linear Algebra, Valencia, Spain
1/2012	Block Krylov Subspace Recycling, Joint Mathematics Meeting, Boston, MA
	Invited colloquium & seminar talks
11/2022	Analysis of block GMRES using a new *-algebra-based approach , Irish Numerical Analysis Forum (virtual), Dublin, Ireland
11/2020	Augmented gradient descent methods, Google Machine Learning Tea Talk (virtual), Dublin, Ireland
10/2019	Augmented Krylov subspace methods for well- and ill-posed problems, Charles University, Prague, Czech Republic
3/2019	Prescribing and describing convergence behavior of block Arnoldi and GMRES, University College Cork, Cork, Ireland
3/2019	Prescribing and describing convergence behavior of block Arnoldi and GMRES , <i>Dublin City University</i> , Dublin, Ireland
10/2018	Augmented Arnoldi-Tikhonov methods for ill-posed problems, Oxford University, Oxford, England
10/2018	Augmented Arnoldi-Tikhonov methods for ill-posed problems, University of Strathclyde, Galway, Scotland
10/2018	Augmented Arnoldi-Tikhonov methods for ill-posed problems, University of Bath, Bath, England
9/2018	Augmented Arnoldi-Tikhonov methods for ill-posed problems, NUI Galway, Galway, Ireland
4/2018	Subspace augmentation for iterative methods for well- and ill-posed problems: recent results and insights, <i>University College Dublin</i> , Dublin, Ireland
3/2018	Krylov Subspace Methods for large-scale computing and imagine reconstruction, University of Limerick, Limerick, Ireland
1/2016	Stagnation of Block GMRES and Its Relationship to Block FOM, Virginia Tech University, Blacksburg, USA
1/2016	Finding Tensor Structure in an III-Posed Problem, Temple University, Philadelphia, USA
6/2015	A Block Krylov subspace recycling approach for solving many shifted systems with arbitrary right-hand sides. Universität Innsbruck. Innsbruck. Austria
4/2015	Pseudo-Block recycled GMRES for solving shifted systems with unrelated right-hand sides , <i>Academy of Sciences of the Czech Republic</i> , Prague, Czech Republic
9/2014	A Block GMRES-like algorithm for the simultaneous solution of shifted linear systems, TU Wuppertal

11/2013	Minimum Residual Methods for Shifted Linear Systems with General Preconditioning, Università di Bologna Applied Mathematics Seminar, Bologna
1/2012	Automated Drawing of Weather Fronts, Community College of Philadelphia Math Club, Philadelphia, PA
	Other talks
7/2016	A modified implementation of MINRES to monitor the residual subvector norms for block systems, 20th Conference of the International Linear Algebra Society, Leuven, Belgium
3/2016	Stagnation of Block GMRES and Its Relationship to Block FOM, GAMM Annual Meeting, Braun- schweig, Germany
9/2014	A Block GMRES-like algorithm for the simultaneous solution of shifted linear systems, 4th IMA Conference on Numerical Linear Algebra and Optimization, Birmingham, UK
7/2014	Minimum Residual Methods for Nonsymmetric Shifted Linear Systems with Preconditioning, GAMM-ALAMA Applied Linear Algebra Joint Meeting, Barcelona
7/2013	Block Krylov Subspace Recycling: Theory and Application in a Newton Iteration, International Conference On Preconditioning Techniques, Prague, Czech Republic
6/2013	Krylov Subspace Recycling for Families of Shifted Linear Systems, 25th Biennial Numerical Analysis Conference, Strathclyde
6/2013	Block Krylov Subspace Recycling: Theory and Application in a Newton Iteration, International Conference On Preconditioning Techniques For Scientific And Industrial Applications. Oxford
9/2012	Krylov subspace recycling for families of shifted linear systems , <i>GAMM Workshop on Applied Linear Algebra</i> , Chateau Liblice, Czech Republic
7/2011	A Schur Complement Method for Nearly Hermitian Linear Systems, The 7th International Congress on Industrial and Applied Mathematics, Vancouver, Canada
11/2011	Block Krylov Subspace Recycling, Mid Atlantic Numerical Analysis Day, Philadelphia, PA
2/2011	Automated Drawing of Weather Fronts, Temple University Society for Undergraduate Mathematics Seminar, Philadelphia, PA
9/2010	Automatic Weather Front Detection, Temple University Applied Math Seminar, Philadelphia, PA
7/2010	A Schur Complement Approach for Solving a Nearly Hermitian System, SIAM Annual Meeting, Pittsburgh, PA
5/2010	Automatic Weather Front Detection, Temple Applied Math Seminar, Philadelphia, PA
10/2009	Properties of Progressive GMRES and Flexible Conjugate Gradients , <i>Temple Applied Math Seminar</i> , Philadelphia, PA
10/2009	Properties and Stability of Progressive GMRES , <i>SIAM Conference on Applied Linear Algebra</i> , Monterrey, CA
	Projects
Since 8/2020	Multishift recycled block GMRES for large Lattice-QCD problems , with Andreas Frommer, Gustavo Ramírez, and Liam Burke (PhD Student)
Since 8/2020	Accurate localizatin of brain sources from EEG measurements, with Bahman Nasserleslami
Since 5/2020	Simulation of open ocean windfields and their interactions with wind turbines , with Biswajit Basu, Breiffni Fitzgerald, and Sudipta Basu
Since 8/2018	Tensor structured linear systems for reconstruction of cosmic microwave background , with Simon Wilson
Since 1/2018	Acceleration of linear iterative solvers for wireless radiowave propagation modeling, with Conor Brennan

7/2016-7/2018	Fast computation of magnetization in air-gapped transformers using a boundary element
2010	method, with Stefan Janacek and Peter Hamberger, during consultancy with Siemens Austria
	1/2010 – 12/2010, Semi-automated Measurement of Aortic Diameter for Diagnosis of Aortic Aneurysm
1/2010 - 1/2013	Automatic Weather Front Detection, with Meredith Hegg and Benjamin Seibold
	Membership in Professional Society
Since 2022	International Linear Algebra Society
Since 2021	SIAM UKIE Chapter
Since 2019	Irish Mathematics Society, member and Trinity College representative
Since 2018	GAMM-The International Association for Applied Mathematics and Mechanics (Gesellschaft für angewandte Mathematik und Mechanik), member of its activity groups on Applied Linear Algebra
Since 2011	SIAM (Society for Industrial and Applied Mathematics), member of its activity groups on Applied Linear Algebra
	Service to University
Since 8/2022	Course Coordinator, MSc in High Performance Computing , Trinity College Dublin School of Mathematics
Since 8/2022	College Tutor, Trinity College Dublin School of Mathematics
8/2018-8/2022	Student Exchange Coordinator, Trinity College Dublin School of Mathematics
Since 2018	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Dublin, Ireland.
Fall 2011	Undergraduate Mathematical Modeling Competition , <i>Mentor and judge</i> , Temple University, Philadel-phia, PA
Fall 2010 - 2012	Grad Student Peer Resource, Resource for younger graduate students, Temple University, Philadelphia, PA
	Activities as Organizer & Service to Profession
Summer 2023	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Dublin, Ireland, Budget: € 17000
4/2023	Organizer, SIAM UKIE Annual Sectional Meeting, Trinity College Dublin, Ireland
1/2023 - 12/2026	Committee on the Gene Golub SIAM Summer School, SIAM
Summer 2022	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Dublin, Ireland, Budget: € 15000
7/2022	Organization of minisymposium <i>Reusing information in iterative methods</i> , 27th International Conference on Domain Decomposition Methods, Prague, Czech Republic (together with Erin Carson and Petr Vacek)
1/2022	Organizer, SIAM UKIE Annual Sectional Meeting, Virtual (due to pandemic restrictions)
4/2022	Organizer , 2nd Lanczos Workshop: Continuous and discrete iterative methods for image and signal reconstruction, Dublin, Ireland., Budget: € 6000
10/2021	Bright Club Ireland Science Outreach Event, Math & Everyday Life!, Dublin, Ireland

Summer 2021	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Online due to pandemic, Budget: € 15000
04/2021 - 04/2023	Vice President, SIAM UK and Ireland Section
5/2021	Organization of minisymposium <i>Block Krylov Subspace Methods for Scientific Computing</i> , <i>SIAM ALA</i> , New Orleans, USA (together with Erin Carson and Kathryn Lund)
3/2021	Organization of minisymposium Using Data to Drive Iterative Methods: Subspace Recycling and Other Techniques, SIAM CSE, Dallas, USA (together with Eric de Sturler)
3/2021	Organization of Session 17: Applied and numerical linear algebra , <i>GAMM Annual Meeting</i> , Kassel, Germany (together with Kathryn Lund and John Pearson)
Summer 2020	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Online due to pandemic, Budget: € 15000
10/2020	Bright Club Ireland Science Outreach Event, What is numerical analysis, Online
1/2020	Founding faculty supervisor Dublin Area Universities SIAM-IMA Student Chapter , Cofunded by SIAM and IMA, Dublin, Ireland (together with Nicole Beisiegel)
7/2019	Organization of minisymposium <i>Model reduction, randomization, dimension reduction and other methods for the efficient solution of large-scale inversion, design, and sampling</i> , <i>ICIAM</i> , Valencia, Spain (together with Eric de Sturler)
6/2019	Organizer , <i>Hamilton Mathematics Institute Workshop: Beyond the discrete: iterative methods from the continuum perspective</i> , Dublin, Ireland., Budget: € 12000
Summer 2019	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Dublin, Ireland., Budget: € 15000
3/2018-8/2018	Organizer and Coordinator , <i>Hamilton Trust Summer Mathematics Internship Programme</i> , Dublin, Ireland., Budget: € 15000
12/2017	Best student talk prize judge, SIAM NUI Galway Student Chapter Annual Conference, Galway, Ireland
11/2017 •	Panelist-Mathematician , <i>How I Came to Hate Math Screening and Public Discussion</i> , Alliance Francaise, Dublin, Ireland
3/2017	"Science Slam" Science Communication Event , Die Numerik: <i>Wie ich lernte, mit Kevin zu rechnen</i> , First Place, Linz, Austria
10/2015	https://math.soodhalter.com/sciences1am2017 Organization of minisymposium Iterative Methods for Solving Families of Shifted Linear Systems SIAM Applied Linear Algebra Meeting 2015 Atlanta LISA (together with Martin van Güren)
9/2013 •	Organization of minisymposium <i>Iterative Methods for III-Posed Problems</i> , <i>IFIP TC7 Conference on System Modelling and Optimization</i> , Klagenfurt, Austria (together with Ronny Ramlau and Elena Resmerita)
	Editorial & Review Activities
Since 2021	Member of Editorial Board, Electronic Transactions on Numerical Analysis
Since 2013	Managing editor, Electronic Transactions on Numerical Analysis

Manuscripts reviewed for

Applied Mathematics and Computation Applied Numerical Mathematics BIT Numerical Mathematics Computational Methods in Applied Mathematics Computer Physics Communications ESAIM: Mathematical Modelling and Numerical Analysis Electronic Transactions on Numerical Analysis IMA Journal of Numerical Analysis Inverse Problems Journal of Computational and Applied Mathematics Journal of Scientific Computing Numerical Algorithms Numerical Mathematics: Theory, Methods and Applications SIAM Journal on Matrix Analysis SIAM Journal on Scientific Computing Signal Processing

Teaching Experience (in English unless otherwise noted)

- Autumn 2022 Introduction to Programming, Lecturer, Redeveloped/Updated Course
- Autumn 2022 Numerical Methods for HPC, Lecturer, Course Developer
- Summer 2022 Case Studies in HPC: Communication-avoiding Methods Unit, Lecturer, Unit Developer
- Summer 2022 Numerical Analysis, Lecturer, Course Developer
- Autumn 2021 Mathematics for Scientists I, Lecturer, (online)
- Autumn 2021 Numerical Methods for HPC, Lecturer, Course Developer
- Summer 2021 Case Studies in HPC: Communication-avoiding Methods Unit, Lecturer, Unit Developer, (online)
- Summer 2021 Numerical Analysis, Lecturer, Course Developer, (online)
- Autumn 2020 Mathematics for Scientists I, Lecturer, (online)
- Autumn 2020 Numerical Methods for HPC, Lecturer, Course Developer, (online)
- Summer 2020 Advanced Calculus, Lecturer
- Summer 2020 Parallel Numerical Algorithms, Lecturer
- Autumn 2019 Mathematics for Scientists I, Lecturer
- Summer 2019 Advanced Calculus, Lecturer
- Summer 2019 **Parallel Numerical Algorithms**, Lecturer
- Autumn 2018 Mathematics for Scientists I, Lecturer
- Summer 2018 Parallel Numerical Algorithms, Lecturer, Course Developer
- Winter 2016 Integral Equations and Boundary Value Problems, Lecturer
- Spring 2016 Mathematics for Chemists Exercises, Course Instructor, (German)

Spring 2016	Partial Differential Equations Exercises, Course Instructor
Winter 2015	Integral Equations and Boundary Value Problems, Lecturer
Spring 2015	Analysis II Exercises, Course Instructor, (German)
Spring 2015	Partial Differential Equations Exercises, Course Instructor
Winter 2014	Mathematical Methods for Continuum Mechanics Exercises, Course Instructor
Winter 2014	Integral Equations and Boundary Value Problems Exercises, Course Instructor
Spring 2014	Analysis II Exercises, Course Instructor, (German)
Spring 2014	Partial Differential Equations Exercises, Course Instructor
Winter 2013	Mathematical Methods for Continuum Mechanics Exercises, Course Instructor
Winter 2013	Integral Equations and Boundary Value Problems Exercises, Course Instructor, (German)
Spring 2013	Krylov Subspace Methods, Lecturer
Spring 2013	Partial Differential Equations Exercises, Course Instructor
Winter 2012	Mathematical Methods for Continuum Mechanics Exercises, Course Instructor
Winter 2012	Integral Equations and Boundary Value Problems Exercises, Course Instructor
Fall 2011	College Algebra, Lecturer
Fall 2008	Calculus III, Teaching Assistant, Worked with students one-on-one
Fall 2008	Calculus II, Teaching Assistant, Conducted recitations
Spring 2008	Precalculus, Lecturer
Fall 2007	College Algebra, Lecturer
Spring 2007	Calculus III, Teaching Assistant, Worked with students one-on-one
Fall 2006	Calculus I, Teaching Assistant, Worked with students one-on-one
	PhD Students Supervised
Since 2020	Liam Burke, Block Krylov Subspace Methods
Since 2022	Siobhán Correnty, Krylov subspace methods for parameterized linear systems, student at KTH Stockholm
10/2021-1/2022	- WITH EIIAS JATIEDTING Petr Vacek , <i>Multigrid with Subspace Reycling</i> , (as a research intern visiting from Czech Republic - with Erin Carson)

10/13

	Masters Theses Supervised
Summer 2022	Anindya Banerjee, Modelling of Non Linear Irrotational Water Waves Using High Performance Computing, (co-supervision with Biswajit Basu)
Summer 2022	Fan Bu , <i>Communication-avoiding Krylov methods for polynomial preconditioning in QCD simulation</i> , (co-supervision with Jose Refojo)
Summer 2022	Alexander Sanfilippo , Parallelization of NEAT algorithm for genetic algorithm optimization of neural networks
Summer 2021	Hugh Delaney , <i>The Matrix Exponential as a Graph Centrality Measure: A Parallel Lanczos Method Using CUDA</i> , (co-supervision with Jose Refojo)
Summer 2021	William O Sullivan, Communication-Avoiding Tall-Skinny LU Factorisation
Summer 2019	Alex Keating, Extension of parallel approaches to the finite element method using CUDA
Summer 2019	Conor McCrossan, Efficient implementation of communication-avoiding LU-factorization
Summer 2019	Wandri Jooste, Computational Methods in Ice Sheet Modeling
Summer 2018	Aaron Dees , <i>Parallel Iterative Solver for 3D Helmholtz equation using preconditioned conjugate gradient method on GPU</i> , (co-supervision with Jose Refojo)
Summer 2018	Nathan O'Duilll, Efficient implementation of communication-avoiding LU-factorization

Masters Theses Refereed

2022	Dylan Kierens , Parallelization of a Computational Fluid Dynamics Model solving for Astrophysical Shock and Contact Waves
2022	Sam McKeown, Parallel Approaches to Factoring Polynomials over Finite Fields
2021	Fionntan OSuibhne , Investigation into the Numerical Computation of the Laplace Heat Equations for 2D Conduction
2020	Guangze Zhang, Analysis of Finite Difference Methods on Parabolic Partial Differential Equations
2020	Christopher Swords, Parallelisation techniques for HDP topic modelling
2019	Jiazhou Liu, Visual Simulation of Animal Group Behavior Using CUDA Acceleration
2018	Heather Dartry, A parallel numerical algorithm for the Poisson equation
	Bachelor Student Projects Supervised
2021-2022	Christopher Duignan, Complex time-stepping schemes for the numerical solution of ODEs

- 2021-2022 **Kate Havenga**, Hybrid iterative methods for image and signal reconstruction
- Summer 2021 Sebastian Chejniak, Kate Havenga, Maria-Chiara Lisotti, Solving large, sparse linear systems using Krylov subspaces
- <u>James Kirwan</u>, *Relationship of CG and CG-Tikhonov as regularizers*
- 2020-2021 **David Young**, Implicit gradient descent regularization for machine learning

2020-2021	Daniel Owens, Analysis of limited-angle tomography techniques
Summer 2020	Jan Becker, Cathal Maguire, Conor Boylan , Modelling the Spread of Disease through the Collisions of Particles
2019-2020	Caelen Feller, Solving Laplace problems with corner singularities
2019-2020	James Hennigan, Iterative strategies for estimating model error during Bayesian inversion
2019-2020	Kevin Murphy, Machine learning for handwritten digit recognition
2019-2020	Aoife Kearins, A mathematical model of transient population dynamic species, (Laidlaw Undergraduate Research and Leadership Programme)
Summer 2019	James Kirwan, Image Restoration With Töplitz-Structure Blurring Models
Summer 2018	Conor O'Mara, Vladyslav Sirenko, and Adam Keogh , Development of mathematical techniques to combine and exploit the EMG measurements for diagnosis of Motor Neuron Disease
	Bachelor Student Theses Refereed
2022	Colum Flynn , Green's functions and the beam equation
2022	Philip Kruger, Karl Weierstrass the Father of Modern Analysis
2021	Patrick Sinnott, Numerical Analysis of nonlinear fourth-order Differential Equations
2021	Kathryn Mooney, The oscillatory behaviour of some non-linear fourth order differential equations
2020	Michael Kane, Reinforcement learning
2020	Rory McNally, Mathematical biology
2019	Jane Kirkpatrick, Applications of Differential Equations in Mathematical Biology
2019	Rebecca Guiney, Modelling HIV/AIDS Epidemic in Cuba.
2018	Barry Fitzpatrick, The Black Scholes Model and its Extension to Options on Many Underlying Assets
	Visiting Students Supervised
	Quentin Houssier , <i>Application of</i> * <i>-algebra in numerical linear algebra</i> , Masters Student, Lyon, France, Erasmus Traineeship
2021	Petr Vacek, Subspace Recycling and Multigrid, PhD Student, Prague, Czech Republic, Erasmus Traineeship
2022	Siobhán Correnty, Infinite Krylov Subspace Methods for Parameterized Linear Systems, PhD Student, Stockholm, Sweden, Erasmus Traineeship
	Funded workshops attendance
June 21–25, 2008	SIAG/LA-SIMUMAT International Summer School on Numerical Linear Algebra, International Center for Mathematical Meetings, Castro Urdiales, Cantabria, Spain
July 20–28, 2010	Industrial Mathematical and Statistical Modeling Workshop for Graduate Students, Center for Research in Scientific Computation, Raleigh, NC, United States

June 7–18, 2010	2010 Gene Golub SIAM Summer School on Numerical Linear Algebra , <i>Hotel Sierra Silvana</i> , Selva di Fasano, Bari, Italy
	Awards
Spring 2012	Dissertation Completion Fellowship, Temple University
2006-2008	Dean's Graduate Scholarship, Temple University, Philadelphia, PA
	Travel Grants
1/2012	Joint Mathematics Meeting 2012, Travel and Accommodation, Boston, MA
7/2011	ICIAM 2011, Travel and Accommodation
6/2011	Householder Symposium 2011, Travel and Accommodation
3/2011	SIAM Conference on Computational Science and Engineering, Travel and Accommodation
10/2016	CIRM Conference on Numerical Linear Algebra and Applications, Accommodation

References

Available upon request

Dublin, December 5, 2022