STEFAN GÜTTEL

The University of Manchester
School of Mathematics
Alan Turing Building
Manchester M13 9PL

Phone +44 161 275 5849
Mobile +44 7449 348 273
Email stefan@guettel.com
Website www.guettel.com

Research interests

Numerical Analysis	Development of efficient polynomial and rational Krylov methods for high-dimensional linear algebra problems related to PDEs; in particular, (nonlinear) eigenvalue problems and approximation of matrix functions. Convergence analysis of these methods.
Scientific Computing	Fast algorithms for the solution of Maxwell's equations in time and frequency domain, with applications in geophysical prospecting. Construction of optimal absorbing boundary conditions for Helmholtz problems.
Industrial Modeling	Solution methods for complex models arising in industry, including statistical data-intensive problems that can be tackled by modern numerical linear algebra techniques.
Approximation Theory	Optimal pole selection in parameter-dependent rational approximation. Asymptotic convergence behavior of iterative methods and relations to logarithmic potential theory.
Parallel Algorithms	Development, analysis, and applications of algorithms suited for parallel computers; time-parallel integrators for ODEs.

Professional experience

since 06/2016 **The University of Manchester (UK)**

- Senior Lecturer in Numerical Analysis
- Research-intensive position with teaching and administration duties
- Supervision of three PhD students (one supported by a "President's Doctoral Scholar Award" of the university) and a postdoc (funded by a Knowledge Transfer Partnership)
- Completed New Academics Programme with "Excellent"; Fellow of the Higher Education Academy
- Head of International Admissions in the School of Mathematics

09/2012–05/2016 **The University of Manchester (UK)**

- Lecturer in Numerical Analysis
- Lecturing and tutoring Year 1–3 Mathematics students and Civil Engineering students (nominated for "Best EPS Lecturer" and "Most Innovative Lecturer" in the Manchester Teaching Awards 2013)

- Academic Adviser to Year 1–3 students, supervision of Year 4 undergraduate projects and co-examination of M. Sc. theses, and marking
- Received "Exceptional Performance Reward" from the Faculty in 2014

Postdoctoral experience

08/2011–08/2012 **University of Oxford (UK)**

- Funded by the *Deutsche Forschungsgemeinschaft* (DFG)
- Research on polynomial and rational interpolation, matrix functions, nonlinear eigenvalue problems, and rational Krylov methods
- Involved in the Chebfun project
- Tutored Numerical Analysis and co-supervised an MSc student
- Associate Middle Common Room member of Worcester College
- Adviser: Prof. Nick Trefethen

03/2010–07/2011 **University of Geneva (Switzerland)**

- Taught Numerical Analysis and Optimization courses
- Preparation of problem sheets, grading of students, and examination
- Development and analysis of novel time-parallel algorithms based on ideas from domain decomposition methods
- Adviser: Prof. Martin Gander

Education

12/03/2010 **PhD (Dr. rer. nat.) from Technische Universität Bergakademie Freiberg**

- Thesis: "Rational Krylov Methods for Operator Functions"
- Adviser: Prof. Michael Eiermann
- Referees: Prof. Axel Ruhe, Prof. Nick Trefethen
- Best possible degree with distinction (*summa cum laude*)
- Nominated for the 2011 Householder Award

06/2008–08/2008 **National Institute of Informatics, Tokyo (Japan)**

- Funded by a JSPS fellowship
- Research on matrix function approximations
- Hosted by Prof. Ken Hayami

08/2006–02/2010 **PhD candidate at Technische Universität Bergakademie Freiberg**

- Funded by the DFG as a research assistant
- Research on fast numerical simulation of transient electromagnetic fields (Maxwell's equations) in a geophysical application

- Applications of restarted Krylov methods for matrix functions
- Teaching exercises on *Approximation Theory* and *Numerical Solution of Ordinary Differential Equations*
- Preparation of problem sheets and grading of students' work

08/2005–03/2006 **University of Cyprus, Nicosia (Cyprus)**

- Funded by a DAAD scholarship
- Studied relations between logarithmic potential theory and orthogonal polynomials
- Hosted by Prof. Nikos Stylianopoulos

10/2001–06/2006 **Undergraduate studies at Technische Universität Bergakademie Freiberg**

- Diploma in *Applied Mathematics*
- Minors in *Computer Science* and *Economy*
- Thesis: "Convergence estimates of Krylov subspace methods for the approximation of matrix functions using tools from potential theory"
- Grade A with honours
- Awarded the Georgius-Agricola medal of the university

Grants, awards, and recognitions

02/2017 **Better World Award 2017**
Recognition of the university for my work on "Detecting and Reducing Redundancy in Industrial Alarm Systems".

06/2016 **Promotion to Senior Lecturer**
Promotion on the basis of research, teaching, administration, and knowledge transfer achievements.

08/2014 **Exceptional Performance Reward**
Salary increase as a recognition of exceptional work performance and commitment to the university.

03/2014 **MAPLE Platform Fund (£8,750 as co-PI)**
Internal funding from the School for holding the Alan Turing Day. I also received funds for hosting five international academic visitors, each for one week.

01/2014 **EPS Faculty Strategic Fund (£2,000 as PI)**
Internal funding from the Faculty of Engineering and Physical Sciences (EPS) for "Enhancing the Undergraduate and Postgraduate Student Experience".

07/2013 **Knowledge Transfer Partnership grant (£245,378 as PI)**
This grant from the *Technology and Strategy Board* funds a 3-year postdoctoral position under my supervision. The project is related to data assimilation and machine learning algorithms with industrial applications.

05/2013 **Manchester Teaching Awards nominations**
I was nominated by students for "Best EPS Lecturer" and "Most Innovative Lecturer".

07/2012 **LMS Research Workshop grant (£2,975 as PI)**
This is a grant I received from the *London Mathematical Society* for the organization of a workshop on space-time-parallel methods in Manchester.

08/2011 **DFG postdoc stipend (£49,500)**
This scholarship of the *Deutsche Forschungsgemeinschaft* enabled me to work as a postdoc at the University of Oxford for 2 years. I used only half of the stipend due a lectureship offer from The University of Manchester.

06/2011 **Householder nomination and Poster Award 2011**
I won the poster award at the Householder Symposium in Tahoe City (USA). My thesis was shortlisted for the 2011 Householder Award and received an honorable mention.

10/2009 **Scientific Computing Poster Award**
I won this award at the annual conference of the *Werkgemeenschap Scientific Computing* in The Netherlands.

06/2008–08/2008 **JSPS fellowship**
I was awarded this fellowship of the *Japan Society for the Promotion of Science* for an extended research visit to Japan.

10/2007 **Georgius-Agricola medal**
This medal is awarded once a year by the Technische Universität Freiberg and I received it for the best Diploma thesis and social engagement as a student.

09/2005–12/2005 **DAAD stipend for abroad studies**
This stipend of the *Deutscher Akademischer Austauschdienst* enabled me to study and complete my Diploma thesis at the University of Cyprus.

Other funding

03/2017–09/2017 **Autotrader MSc Studentship**
This studentship funds an MSc student under my supervision working on recommendation systems for Auto Trader website.

03/2016–09/2016 **Autotrader MSc Studentship**
Funding an MSc student working on graph partitioning algorithms.

09/2016–09/2019 **Sabisu CASE PhD Studentship**
Following a successful knowledge transfer partnership, Sabisu sponsors a PhD student working under my supervision. The project will be devoted to real-time clustering of time series.

Publications in peer-reviewed journals

Google Scholar profile: `https://scholar.google.de/citations?user=zey3HmMAAAAJ&hl=en`

M. BERLJAFA AND S. GÜTTEL. Parallelization of the rational Arnoldi algorithm, to appear in *SIAM Journal on Scientific Computing*, 2017. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2503/`

V. DRUSKIN, S. GÜTTEL, AND L. KNIZHNERMAN. Near-optimal perfectly matched layers for indefinite Helmholtz problems, *SIAM Review*, 58(1):90–116, 2016.

S. GÜTTEL AND Y. NAKATSUKASA. Scaled and squared subdiagonal Padé approximation for the matrix exponential, *SIAM Journal on Matrix Analysis and Applications*, 37(1):145–170, 2016.

S. GÜTTEL, E. POLIZZI, P. TANG, AND G. VIAUD. Zolotarev quadrature rules and load balancing for the FEAST eigensolver, *SIAM Journal on Scientific Computing*, 37(4):A2100–A2122, 2015.

R.-U. BÖRNER, O. G. ERNST, AND S. GÜTTEL. Three-dimensional transient electromagnetic modeling using rational Krylov methods, *Geophysical Journal International*, 202(3):2025–2043, 2015.

M. BERLJAFA AND S. GÜTTEL. Generalized rational Krylov decompositions with an application to rational approximation, *SIAM Journal on Matrix Analysis and Applications*, 36(2):894–916, 2015. (Awarded the 2016 SIAM Student Paper Prize.)

A. FROMMER, S. GÜTTEL, AND M. SCHWEITZER. Convergence of restarted Krylov subspace methods for Stieltjes functions of matrices, *SIAM Journal on Matrix Analysis and Applications*, 35(4):1602–1624, 2014.

S. GÜTTEL, R. VAN BEEUMEN, K. MEERBERGEN, AND W. MICHIELS. NLEIGS: A class of robust fully rational Krylov methods for nonlinear eigenvalue problems, *SIAM Journal on Scientific Computing*, 36(6):A2842–A2864, 2014.

S. GÜTTEL AND G. KLEIN. Efficient high-order rational integration and deferred correction with equispaced data, *Electronic Transactions on Numerical Analysis*, 41:443–464, 2014.

A. FROMMER, S. GÜTTEL, AND M. SCHWEITZER. Efficient and stable Arnoldi restarts for matrix functions based on quadrature, *SIAM Journal on Matrix Analysis and Applications*, 35:661–683, 2014.

S. GÜTTEL AND J. PESTANA. Some observations on weighted GMRES, *Numerical Algorithms,* 67(4):733–752, 2014.

E. JARLEBRING AND S. GÜTTEL. A spatially adaptive iterative method for a class of nonlinear operator eigenproblems, *Electronic Transactions on Numerical Analysis*, 41:21–41, 2014.

M. J. GANDER AND S. GÜTTEL. PARAEXP: A parallel integrator for linear initial-value problems, *SIAM Journal on Scientific Computing*, 35(2):C123–C142, 2013.

P. GONNET, S. GÜTTEL, AND L. N. TREFETHEN. Robust Padé approximation via SVD, *SIAM Review*, 55(1):101–117, 2013.

S. GÜTTEL AND L. KNIZHNERMAN. A black-box rational Arnoldi variant for Cauchy–Stieltjes matrix functions, *BIT Numerical Mathematics*, 53(3):595–616, 2013.

S. GÜTTEL. Rational Krylov approximation of matrix functions: Numerical methods and optimal pole selection, *GAMM-Mitteilungen*, 36(1):8–31, 2013.

S. GÜTTEL AND G. KLEIN. Convergence of linear barycentric rational interpolation for analytic functions, *SIAM Journal on Numerical Analysis*, 50:2560–2580, 2012.

B. BECKERMANN AND S. GÜTTEL. Superlinear convergence of the rational Arnoldi method for the approximation of matrix functions, *Numerische Mathematik*, 121:205–236, 2012.

J. GEISER AND S. GÜTTEL. Coupling methods for heat transfer and heat flow: Operator splitting and the parareal algorithm, *Journal of Mathematical Analysis and Applications*, 388:873–887, 2012.

M. EIERMANN, O. G. ERNST, AND S. GÜTTEL. Deflated restarting for matrix functions, *SIAM Journal on Matrix Analysis and Applications,* 32:621–641, 2011.

B. BECKERMANN, S. GÜTTEL, AND R. VANDEBRIL. On the convergence of rational Ritz values, *SIAM Journal on Matrix Analysis and Applications,* 31:1740–1774, 2010.

M. AFANASJEW, M. EIERMANN, O. G. ERNST, AND S. GÜTTEL. A generalization of the steepest descent method for matrix functions, *Electronic Transactions on Numerical Analysis,* 28:206–222, 2008.

M. AFANASJEW, M. EIERMANN, O. G. ERNST, AND S. GÜTTEL. Implementation of a restarted Krylov subspace method for the evaluation of matrix functions, *Linear Algebra and its Applications,* 429:2293–2314, 2008.

Peer-reviewed conference proceedings

T. D. BUTTERS, S. GÜTTEL, J. L. SHAPIRO, AND T. J. SHARPE. Automatic real-time fault detection for industrial assets using metasensors, *Proceedings of the 2015 Asset Management Conference, The Institute of Engineering and Technology*, pages 1–6, 2015.

T. D. BUTTERS, S. GÜTTEL, AND J. L. SHAPIRO. Detecting and Reducing Redundancy in Alarm Networks, *Proceedings of the IEEE International Conference on Automation Science and Engineering (CASE)*, pages 1224–1229, 2015.

T. D. BUTTERS, S. GÜTTEL, J. L. SHAPIRO, AND T. J. SHARPE. Statistical cluster analysis and visualisation for alarm management configuration, *Proceedings of the 2014 Asset Management Conference, The Institute of Engineering and Technology*, pages 1–6, 2014.

S. GÜTTEL. A parallel overlapping time-domain decomposition method for ODEs, In R. Bank et al. (eds.), *Domain Decomposition Methods in Science and Engineering XX, Lecture Notes in Computational Science and Engineering 91,* pages 483–490. Springer-Verlag, Berlin, 2013.

S. GÜTTEL AND L. KNIZHNERMAN. Automated parameter selection for rational Arnoldi approximation of Markov functions, *Proceedings in Applied Mathematics and Mechanics*, 11:15–18, 2011.

M. AFANASJEW, R.-U. BÖRNER, M. EIERMANN, O. G. ERNST, S. GÜTTEL, AND K. SPITZER. Two-dimensional time domain TEM simulation using finite elements, an exact boundary condition, and Krylov subspace methods, *Proceedings of the 20th IAGA Workshop on Electromagnetic Induction in the Earth*, 2010.

Submitted articles

S. GÜTTEL AND F. TISSEUR. The nonlinear eigenvalue problem, submitted 2017. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2531/`

V. DRUSKIN, S. GÜTTEL, AND L. KNIZHNERMAN. Compressing variable-coefficient exterior Helmholtz problems via RKFIT, submitted 2016. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2511/`

S. GÜTTEL AND J. W. PEARSON. A rational deferred correction approach to PDE-constrained optimization, submitted 2016. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2505/`

M. BERLJAFA AND S. GÜTTEL. The RKFIT algorithm for nonlinear rational approximation, submitted 2015. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2530/`

Theses

S. GÜTTEL. Rational Krylov Methods for Operator Functions, TU Bergakademie Freiberg, PhD thesis, published online at http://nbn-resolving.de/urn:nbn:de:bsz:105-qucosa-27645, 2010.

S. GÜTTEL. Convergence Estimates of Krylov Subspace Methods for the Approximation of Matrix Functions Using Tools from Potential Theory, TU Bergakademie Freiberg, Diploma thesis, 2006. Manchester E-Print available at `http://eprints.ma.man.ac.uk/2301/`

Conference and workshop organization

01/2017 Co-organizer of the 2016 SIAM UKIE Annual Meeting at the University of Strathclyde (`http://maths.manchester.ac.uk/siam-ukie/meetings.html`, in my role as Secretary/Treasurer of SIAM UKIE)

12/2015 Adviser and speaker at the *Student Industry Challenge* organized by the Manchester SIAM Student Chapter (`http://www.maths.manchester.ac.uk/~siam/sabisu1511/`)

06/2015 Organizer of the *Emerging Technology Conference 2015* at The University of Manchester (`http://emit.manchester.ac.uk/`)

03/2015 Elected section organizer for the *GAMM Annual Meeting 2015* in Lecce (Italy) (`http://gamm2015.unisalento.it/`)

06/2014 Organizer of the *Alan Turing Day 2014* with about 50 participants at The University of Manchester (`http://www.maths.manchester.ac.uk/news-and-events/events/turingday2014/`)

06/2013 Sole organizer of the LMS funded workshop on *Innovative Space–Time Parallel Methods* with 62 participants at The University of Manchester (`http://www.mims.manchester.ac.uk/events/workshops/spacetime/`)

04/2013 Organizer of the *Advances in Matrix Functions and Matrix Equations* workshop with 54 participants at The University of Manchester (`http://www.mims.manchester.ac.uk/events/workshops/FUN13/`)

Plenary talks at conferences and workshops

07/2017 SIAG-LA Plenary Lecturer at the ILAS 2017 conference at Iowa State University (USA)

03/2016 "The RKFIT Method for Nonlinear Rational Approximation" at the *GAMM Annual Meeting* in Braunschweig (Germany)

01/2016 "Parallelizing the Rational Arnoldi Method" at the *Bath–RAL Numerical Analysis Day* in Didcot (UK)

06/2014 "Perfectly Matched Layers for Helmholtz Problems" at the *Householder Symposium XIX on Numerical Linear Algebra* in Spa (Belgium)

03/2014 "Optimized Quadrature and Load Balancing for FEAST" at the *Algorithms, Software and Applications in Petascale Computation* workshop in Tsukuba (Japan)

06/2011 "Time-Parallel Integration of Linear ODEs" at the *Parallel-in-Time Integration Schemes* workshop in Lugano (Switzerland)

Other conference and workshop talks

List of [c]ontributed and [i]nvited minisymposia talks I gave at conferences and workshops:

[c] GAMM Workshop on Applied and Numerical Linear Algebra, TU Hamburg-Harburg (Germany), 09/2016

[i] ICIAM 2015 (2 invited talks), Beijing (China), 08/2015

[i] The Joint British (Applied) Mathematical Colloquium 2015, Cambridge (UK), 03–04/2015

[c] GAMM Annual Meeting, Lecce (Italy), 03/2015

[i] SIAM Annual Meeting, Chicago (USA), 07/2014

[i] 85th Annual Scientific Conference of GAMM, Erlangen (Germany), 03/2014

[c] GAMM Workshop on Applied and Numerical Linear Algebra, Wuppertal (Germany), 09/2013

[i] SIAM Annual Meeting (2 talks), San Diego (USA), 07/2013

[i] SIAM Conference on Computational Science and Engineering (2 talks), Boston (USA), 03/2013

[i] 3rd Dolomites Workshop on Constructive Approx. and Appl. (2 talks), Trento (Italy), 09/2012

[i] DD21 Domain Decomposition, Rennes (France), 06/2012

[i] SIAM Conference on Applied Linear Algebra, Valencia (Spain), 06/2012

[i] ICIAM 2011 (2 talks), Vancouver (Canada), 07/2011

[c] 24th Biennial Conference on Numerical Analysis, Glasgow (UK), 06/2011

[c] Swiss Numerics Colloquium, Lugano (Switzerland), 05/2011

[i] 82nd Annual Scientific Conference of GAMM, Graz (Austria), 04/2011

[i] DD20 Domain Decomposition, San Diego (USA), 02/2011

[i] SIAM Annual Meeting, Pittsburgh (USA), 07/2010

[i] 16th Conference of the International Linear Algebra Society, Pisa (Italy), 06/2010

[i] 8th AIMS Conference on Dynamical Systems, Dresden (Germany), 05/2010

[c] Swiss Numerics Colloquium, Zürich (Switzerland), 04/2010

[i] 2nd Dolomites Workshop on Constructive Approx. and Appl., Trento (Italy), 09/2009

[i] Academy of Sciences Workshop, Prague (Czech Republic), 05/2009

[c] Rolling Waves in Leuven, Leuven (Belgium), 12/2008

[c] 68th DGG (German Geophysical Society) Annual Meeting, Freiberg (Germany), 03/2008

[c] Computational Methods with Applications, Harrachov (Czech Republic), 08/2007

[i] ICIAM 2007, Zürich (Switzerland), 07/2007

[c] 13. Südostdeutsches Kolloqium zur Numerischen Mathematik, Freiberg (Germany), 03/2007

Invited research visits and seminar talks

This is a list of my visits to research institutions for collaboration and seminar talks (since 2010):

10/2016	**University of Oxford (UK)** invited by Prof. Nick Trefethen for a seminar talk
04/2016	**University of Leeds (UK)** invited by Dr. Daniel Ruprecht for a seminar talk
02/2015	**Rutherford Appleton Laboratory (Didcot, UK)** invited by Dr. Tyrone Rees for a seminar talk
12/2014	**University of Strathclyde (Glasgow, UK)** invited by Dr. Victorita Dolean Maini for a seminar talk
08/2014	**KTH Stockholm (Sweden)** invited by Prof. Elias Jarlebring for 1 week
07/2014	**Schlumberger–Doll Research (Boston, USA)** invited by Dr. Vladimir Druskin for 1 week
04/2014	**University of Bologna (Italy)** invited by Prof. Valeria Simoncini for 3 days
03/2014	**University of Tokyo (Japan)** invited by Prof. Yuji Nakatsukasa for 2 days
02/2014	**Durham University (UK)** invited by Dr. Tobias Weinzierl for 2 days
11/2013	**EPF Lausanne (Switzerland)** invited by Prof. Daniel Kressner for 1 week
02/2013	**Courant Institute (New York, USA)** colloquium talk invited by Prof. Michael Overton
02/2013	**Schlumberger–Doll Research (Boston, USA)** invited by Dr. Vladimir Druskin for 1 week
01/2013	**Bergische Universität Wuppertal (Germany)** invited by Prof. Andreas Frommer for 3 days
05/2012	**EPF Lausanne (Switzerland)** seminar talk invited by Prof. Daniel Kressner
03/2012	**Heriot-Watt University Edinburgh (UK)** seminar talk invited by Dr. Sebastian Loisel
03/2012	**University of Edinburgh (UK)** seminar talk invited by Prof. Jared Tanner
11/2011	**Université de Fribourg (Switzerland)** invited by Prof. Jean-Paul Berrut and Dr. Georges Klein for 1 week
11/2011	**Université de Genève (Switzerland)** invited by Prof. Martin J. Gander for 1 week
08/2011	**Katholieke Universiteit Leuven (Belgium)** invited by Prof. Wim Michiels and Dr. Elias Jarlebring for 1 week
06/2011	**Université des Sciences et Technologies de Lille (France)** invited by Prof. Bernd Beckermann for 1 week

08/2010 **Technische Universität Berlin (Germany)**
invited by Dr. Maxim Derevyagin for 3 days

Teaching experience

01/2017–05/2017 **Programming with Python,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 2 students

01/2017–05/2017 **Calculus and Applications,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

01/2016–05/2016 **Programming with Python,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 2 students

01/2016–05/2016 **Calculus and Applications,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

09/2015–01/2016 **Matrix Analysis,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 3 students

09/2015–01/2016 **Calculus and Vectors,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

09/2014–01/2015 **Matrix Analysis,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 3 students

09/2014–01/2015 **Calculus and Vectors,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

01/2014–05/2014 **Mathematics for Civil Engineers,** The University of Manchester
16 hours of lectures and tutorials, examinations, Year 2 students

01/2014–05/2014 **Calculus and Applications,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

09/2013–01/2014 **Matrix Analysis,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 3 students

09/2013–01/2014 **Sets, Numbers, and Functions,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

09/2012–01/2013 **Matrix Analysis,** The University of Manchester
33 hours of lectures and tutorials, examinations, Year 3 students

09/2012–01/2013 **Calculus and Vectors,** The University of Manchester
24 hours of supervision classes (2 groups), Year 1 students

01/2012–03/2012 **Numerical Analysis Part A,** University of Oxford
14 hours of tutorials

03/2011–08/2011 **Analyse numérique II,** University of Geneva
21 hours of programming exercises with grading, undergraduate level

09/2010–02/2011 **Optimization,** University of Geneva
21 hours of tutorials, preparation of MATLAB demonstrations and problem sheets, grading, and final examinations, postgraduate level

09/2010–02/2011 **Analyse numérique I,** University of Geneva
21 hours of programming exercises with grading, undergraduate level

03/2010–08/2010 **Analyse numérique II,** University of Geneva
21 hours of programming exercises with grading, undergraduate level

04/2009–09/2009	**Approximationstheorie,** TU Freiberg 21 hours of exercises with grading, examinations, postgraduate level
10/2008–03/2009	**Numerik gewöhnlicher Differentialgleichungen,** TU Freiberg 21 hours of exercises, undergraduate level

Knowledge transfer and software impact

My research is available and used widely in form of software. In particular, I have been involved in the development of commercial and non-commercial software packages:

- With a postdoctoral researcher funded by my Knowledge Transfer Partnership Grant I am incorporating efficient data assimilation algorithms into the Sabisu platform (`http://sabisu.co`). Sabisu is widely used in modern industrial plants to gather and evaluate vast amounts of sensor and alarm data in real time. Through this collaboration, some of my algorithms run on SABIC Petrochemicals plants (`https://www.sabic.com/europe/en/`).
- I have developed a new approach for managing safety-critical alarms in large industrial plants. The new approach is marketed by Sabisu as a separate software product called SEION (`http://www.sabisu.co/uses/alarm-management`).
- In collaboration with mathematicians at Schlumberger-Doll Research (`http://www.slb.com/about/rd/research/sdr.aspx`) I have developed novel absorbing boundary conditions for indefinite Helmholtz problems that are now used in reservoir simulations.
- The NLEIGS solver which I co-developed [S. GÜTTEL ET AL., *SIAM J. Sci. Comput.,* 36(6):A2842–A2864, 2014] has been incorporated into SLEPc, an extension of the widely-used PETSc toolkit for large-scale eigenvalue problems.
- My optimized quadrature rules for the FEAST eigensolver [S. GÜTTEL ET AL., *SIAM J. Sci. Comput.*, 37(4):A2100–A2122, 2015] have drastically improved the robustness and convergence speed of this parallel algorithm which is part of Intel's Math Kernel Library (MKL), the most used math library for Intel and compatible processors.
- As a member of the Chebfun project (`http://chebfun.org`) I have been involved in various aspects of numerical computing with functions and contributed MATLAB code.
- The Rational Krylov Toolbox (`http://rktoolbox.org`) aims at making available advanced rational Krylov techniques to a large audience of scientists and engineers.

Leadership and service

- I am member of the *Society of Industrial and Applied Mathematics* (SIAM) and the *Gesellschaft für Angewandte Mathematik und Mechanik* (GAMM), having attended and contributed to 10 of their conferences over the past 5 years.
- Since 01/2016 I am Associate Editor for the *SIAM Journal on Scientific Computing*.
- Following elections in 03/2016, I have taken on the role of secretary/treasurer for the SIAM UKIE section (`http://maths.manchester.ac.uk/siam-ukie/`). The section has about 600 members, mainly academics based in the UK and the Republic of Ireland.

- In 07/2015 I have been elected as vice-chair of the *GAMM Activity Group on Numerical and Applied Linear Algebra* (`http://www.maths.manchester.ac.uk/gamm-anla/`), which has more than 90 members, mainly academics based in Europe. This role offers great opportunities to establish new research connections and organize future workshops and conferences.
- Since 05/2015 I am scientific committee member of the *Parallel-in-Time Integration Group* (`http://www.parallelintime.org/`). In this role I help with the organization of workshops and conferences on parallel-in-time integration methods.
- I refereed Starting Grant proposals for the *Engineering and Physical Sciences Research Council* (EPRSC), and more than 40 manuscripts for a number of renowned journals, including:
  - SIAM Journal on Matrix Analysis and Applications
  - SIAM Journal on Scientific Computing
  - SIAM Journal on Numerical Analysis
  - Numerical Algorithms
  - Linear Algebra and its Applications
  - Journal of Computational and Applied Mathematics
  - BIT Numerical Mathematics
  - Mathematics of Computation
  - Computers and Fluids
  - International Journal of Computer Mathematics
- Within our school, I am member of the *Undergraduate Admissions Team* and *Head of International Admissions*. In the latter role I consider international student applications from an academic point of view, making sure that candidates meet our entrance criteria.

Manchester, 25/03/2017