Curriculum Vitæ

Daniel Peterseim
Chair of Computational Mathematics, Universität Augsburg

born May 22, 1980 – Mühlhausen/Thüringen, Germany

nationality German

family status married, two children

affiliation Chair of Numerical Analysis, Institute of Mathematics &
Centre for Advanced Analytics and Predictive Sciences
University of Augsburg
Universitätsstraße 12a, 86159 Augsburg, Germany

phone +49 821 598 2194

email daniel.peterseim@uni-a.de

www http://scicomp.math.uni-augsburg.de

orcid 0000-0001-7213-556X

fields of research Numerical Analysis, Multiscale Modeling & Simulation,
Computational Mechanics, Computational Physics

Work Experience

since 2021 Founding Director of *Centre for Advanced Analytics and Predictive Sciences*
Universität Augsburg, Germany

since 2017 Chair of *Numerical Analysis*
Universität Augsburg, Germany

2013-2017 Professor of *Numerical Simulation* (W3)
Universität Bonn, Germany

2009-2013 Head of Junior Research Group *Numerical Analysis*
DFG Research Center MATHEON *Mathematics for key technologies*
Humboldt-Universität zu Berlin, Germany

2009 (Postdoctoral) Research assistant
Humboldt-Universität zu Berlin, Germany

2004-2008 (PhD and Postdoctoral) Research assistant
Universität Zürich, Switzerland

Education

2016 Habilitation in Mathematics at Humboldt-Universität zu Berlin, Germany

2007 Dr. sc. nat. in Mathematics at Universität Zürich, Switzerland

2004 Diploma in Mathematics at Technische Universität Ilmenau, Germany

Academic Distinctions

2023 Simons Foundation Fellowship, Isaac Newton Institute, Cambridge, UK

2022 Offer: W3-Professorship *Numerical Mathematics of Deterministic and Stochastic Partial Differential Equations* at Freie Universität Berlin

2019 European Research Council (ERC) Consolidator Grant

2017 Teaching award of Faculty of Mathematics and Natural Sciences, Universität Bonn

2016 Offer: W3-Professorship *Computational Partial Differential Equations* at Technische Universität Dortmund
Offer: W3-Professorship *Numerical Analysis* at Leibniz Universität Hannover

2015 Offer: W3-Professorship *Numerical Mathematics in Applications* at Otto-von-Guericke-Universität Magdeburg

2013 Offer: W2-Professorship *Numerical Analysis* at Technische Universität Dresden

2012 MATHEON young investigator award

Invited Lectures (selected)

04/2024 Workshop *Modern Methods for Differential Equations of Quantum Mechanics*, Banff International Research Station (BIRS), Canada

12/2023 Workshop *Numerical PDEs: Adaptivity, Anisotropy, and Control*, Athens, Greece

12/2023 Workshop *Multiscale Model Reduction and Scientific Machine Learning*, Chinese University of Hong Kong, China

11/2023 Workshop *New trends in homogenization*, Roscoff, France

09/2023 Workshop *Numerical Methods for Evolution Equations*, Heraklion, Crete

09/2023 *European Conference on Numerical Mathematics and Advanced Applications – ENUMATH 2023*, Lisbon, Portugal

06/2023 *The 29th Biennial Numerical Analysis Conference*, Glasgow, Scotland

04/2023 Workshop *Multiple Wave Scattering*, Isaac Newton Insitute, Cambridge, UK

07/2022 *Equadiff 15*, Brno, Czech Republic

06/2022 *8th European Congress on Computational Methods in Applied Sciences and Engineering – ECCOMAS 2022*, Oslo, Norway

03/2022 Workshop *Finite Element Methods and Adaptivity*, Technical University of Vienna, Austria

01/2022 *21st GAMM Seminar on Microstructures*, Wien, Austria

09/2021 *BI.DISCRETE21 Numerical Analysis*, Bielefeld, Germany

09/2021 Workshop *Numerical Analysis*, Hannover, Germany

09/2021 French-German Workshop on *Multiscale Problems*, Besancon, France

09/2021 Workshop *Numerical Methods for Evolution Equations*, Heraklion, Crete

07/2021 Workshop *New trends in computational multiscale methods and beyond*, Institut Mittag-Leffler, Stockholm, Sweden (online)

02/2021 Workshop *Multiscale Analysis: Thematic Lectures and Conference (MATLC-2021)* (online)

09/2020 *CECAM workshop on Multiscale simulations of soft matter: New method developments and mathematical foundations*, Mainz, Germany (online)

06/2020 *7th European Seminar on Computing (ESCO) 2020*, Pilsen, Czech Republic (online)

06/2020 *LMS Scottish Numerical Methods Network workshop*, Glasgow, Scotland (online)

02/2020 Workshop *Finite Element Methods for Nonlinear and Multiscale Problems*, IISc Bangalore, India

09/2019 Session *Numerical Methods* at *Dynamics, Equations and Applications*, AGH University of Science and Technology, Kraków, Poland

08/2019 *7th Sino-German Symposium on Computational and Applied Mathematics*, U Kiel, Germany

07/2019 *Workshop on Wave Phenomena*, Karlsruhe, Germany

07/2019 Australian Mathematical Sciences Institute (AMSI) Winter School *Computational Modelling of Heterogenous Media*, Queensland University of Technology, Brisbane, Australia

06/2019 Oberwolfach Seminar *Beyond Numerical Homogenization*, Mathematisches Forschungsintitut Oberwolfach, Germany

04/2019 Workshop *Eigenvalue day*, HU Berlin, Germany

10/2018 Workshop *Computational Engineering*, Mathematisches Forschungsinstitut Oberwolfach, Germany

09/2018 Workshop *Numerical Methods for Evolution Equations*, Heraklion, Crete

07/2018 Summer School *MATH@NTUA*, National Technical Universtiy of Athens, Greece

07/2018 *25th International Conference on Domain Decomposition Methods*, St. John's, Newfoundland, Canada

06/2018 Workshop *Interplay of multiscale data assimilation and data science with advanced PDE discretizations*, Erwin Schrödinger International Institute for Mathematics and Physics (ESI), Vienna, Austria

05/2018 Program *Analysis, Modeling, and Computation for Nanoscale Systems*, The Fields Institute for Research in Mathematical Sciences, Toronto, Canada

10/2017 *Homogenization Theory and Applications*, Weierstraß Institute Berlin, Germany

10/2017 *6th Chinese-German Workshop on Computational Mathematics*, Shanghai, China

08/2017 *Multiscale Methods and Large-scale Scientific Computing*, Hunan University, Changsha, China

07/2017 Workshop *Mechanical and Mathematical Analysis of Nonstandard Discretization Methods*, RWTH Aachen, Germany

07/2017 Workshop *Multiresolution and Adaptivity in Numerical PDEs* at FoCM, Barcelona, Spain

01/2017 Hausdorff School on *Numerical Analysis of Multiscale Problems*, Hausdorff Research Institute for Mathematics Bonn, Germany

Engagement in the Research System

editorial boards SIAM Journal on Numerical Analysis, since 2022

Mathematics of Computation, since 2022

SIAM Multiscale Modeling & Simulation, since 2022

Advances in Discrete and Continuous Models,2021–2023

IMA Journal of Numerical Analysis, since 2020

comittees Conference series European Finite Element Fair, since 2022

Conference series Modern Finite Element Technologies, since 2019

administration Deputy head of Institute of Mathematics, Universität Augsburg, 2021 – 2023

Board of Faculty of Mathematics, Natural Sciences, and Materials Engineering, Universität Augsburg, 2021 – 2023

Head of Institute of Mathematics, Universität Augsburg, 2019 – 2021

member Alexander von Humboldt Foundation "Network Germany", since 2022

Academia Cearense de Mathemática (ACM)
– Corresponding Academician Founder, since 2017

Augsburg Centre for Innovative Technologies (ACIT), since 2017

Hausdorff Center for Mathematics, Bonn (2013–2017)

ECMath - Einstein Center for Mathematics Berlin, 2012–2013

DFG Research Centre Matheon, Berlin, 2008–2013

Gesellschaft für Angewandte Mathematik und Mechanik (GAMM)
– Co-founder/spokesperson Activity Group *Numerical Analysis*, since 2017
– Fachausschuss *Multiscale Material Modeling*, 2013–2016
– GAMM Juniors Mentoring Program, since 2022

Swiss Mathematical Society (SMG)

Society for Industrial and Applied Mathematics (SIAM)

Organization of Scientific Events (selected)

2025 Workshop *Computational Multiscale Methods*, Mathematisches Foschungsinstitut Oberwolfach
with B. Engquist, B. Verfürth, Y. Yang

2024 Workshop *Multiscale Problems*, Hausdorff Research Institute for Mathematics Bonn
with S. C. Brenner, B. Engquist, M. Gunzburger, M.A. Schweitzer

2023 Workshop on nonlinear Schrödinger equations, Universität Augsburg

2023 Jena-Augsburg-Meeting (JAM) on Numerical Analysis, Universität Augsburg
with D. Gallistl, R. Maier

2022 Summer School *Adaptivity, Uncertainty, Learning*, Universität Augsburg
with R. Maier, P. Freese

2022 Winter School *Multiple Scales in Mathematics and Engineering*, Universität Augsburg
with M. Peter and B. Schmidt

2021 Workshop *Scattering in random heterogeneous media*, Universität Augsburg
with F. Bonizzoni

2020–2023 *One World Numerical Analysis Series*, International Center for Mathematical Sciences (online)
with L. Banjai, E. Georgoulis, M. Lopez-Fernandez, C. Makridakis

2020 French-German Workshop on *Multiscale Problems*, Universität Augsburg (online)
with R. Altmann

2019 Workshop *Computational Multiscale Methods*, Mathematisches Foschungsinstitut Oberwolfach
with B. Engquist

2019 Seminar *Beyond Numerical Homogenization*, Mathematisches Foschungsinstitut Oberwolfach
with H. Owhadi

2018 GAMM Workshop on *Numerical Analysis*, Universität Augsburg
with L. Grasedyck

2017 GAMM Workshop on *Numerical Analysis*, RWTH Aachen
with L. Grasedyck

2017 Trimester program *Multiscale Problems: Algorithms, Numerical Analysis and Computation*, Hausdorff Research Institute for Mathematics Bonn
– Winter School *Numerical Analysis of Multiscale Problems*
– Workshop *Numerical Inverse and Stochastic Homogenization*
– Workshop *Non-local Material Models and Concurrent Multiscale Methods*
with S. C. Brenner, B. Engquist, M. Gunzburger, M.A. Schweitzer

2017 Workshop on *Isogeometric Finite Element Data Structures based on Bézier Extraction*, TU Munich
with E. Rank, S. Kollmannsberger, A. Düster, A. Schröder, M. Kästner

Research Funding as Principal Investigator

2023-2026 *Novel Approaches for the Multidimensional Convexification of Inelastic Variational Models for Fracture*
within Priority program 2256 of the German Research Foundation DFG (interdisciplinary, with D. Balzani, Chair of Continuum Mechanics, U Bochum, M. A. Peter, Modelling and Applied Analysis, U Augsburg)
https://gepris.dfg.de/gepris/projekt/441154176

2022-2025 *Autonomous research for exploring structure-property linkages and optimizing microstructures*
German Research Foundation DFG (interdisciplinary, with M. Kästner, Chair of Computational and Experimental Mechanics, TU Dresden)
https://gepris.dfg.de/gepris/projekt/496984632

2021-2024 *Computational Multiscale Methods for Inverse Estimation of Effective Properties of Poroelastic Tissues*
German Research Foundation DFG (with Dr. A. Caiazzo, WIAS Berlin)
https://gepris.dfg.de/gepris/projekt/455719484

2020-2023 *Convexified variational formulations at finite strains based on homogenized damaged microstructures*
within Priority program 2256 of the German Research Foundation DFG (interdisciplinary, with D. Balzani, Chair of Continuum Mechanics, U Bochum, M. A. Peter, Modelling and Applied Analysis, U Augsburg)
https://gepris.dfg.de/gepris/projekt/441154176

2020-2025 *Computational Random Multiscale Problems*
Consolidator Grant 2019 of the European Research Council ERC
https://cordis.europa.eu/project/rcn/226853

2017-2020 *Adaptive isogeometric modelling of discontinuities in complex shaped solids*
within Priority program 1748 of the German Research Foundation DFG (interdisciplinary, with M. Kästner, Chair of Computational and Experimental Mechanics, TU Dresden)
http://gepris.dfg.de/gepris/projekt/255853920

2017-2018 *Space-time multiscale methods for the wave equation in heterogeneous media*
German Academic Exchange Service (DAAD) (with E. T. Chung, Chinese University of Honkong)

2014-2017 *Adaptive isogeometric modelling of propagating strong discontinuities in heterogeneous materials*
within Priority program 1748 of the German Research Foundation DFG (interdisciplinary, with M. Kästner, Chair of Computational and Experimental Mechanics, TU Dresden)
http://gepris.dfg.de/gepris/projekt/255853920

2010-2014 *Modeling and Simulation of Composite Materials*

within DFG Research Center MATHEON
http://www2.mathematik.hu-berlin.de/∼numa/C33/

Supervision & Mentoring of Researchers in Early Career Phases

mentoring *S. Petra* (tenure track professor, since 2023, U Augsburg)

N.T. Tran (junior professor, since 2023, U Augsburg)

M. Kronbichler (tenure track professor, 2022-2023, U Augsburg, now Prof at U Bochum)

F. Bonizzoni (junior professor, 2020-2022, U Augsburg, now Prof at Politecnico di Milano)

post-docs *L. Balazi* (since 2024, U Augsburg)

C. Zimmer (2023, U Augsburg, now at PSI Software AG Berlin)

J. Garay (since 2023, U Augsburg)

Y. Liang (since 2022, U Augsburg, Humboldt Research Fellowship)

J.-P. Freese (since 2021-2023, U Augsburg, now at TU Hamburg)

B. Verfürth (2018-2020, U Augsburg, now Prof at U Bonn, DFG Emmy Noether Independent Junior Research Group 2022)

R. Altmann (2017-2023, U Augsburg, Habilitation 2020, now Prof at U Magdeburg)

M. Schedensack (2015-2017, U Bonn/Augsburg, Marthe-Vogt-Preis – Forschungsverbund Berlin 2016, Humboldt-Preis – HU Berlin 2016, GAMM Dr.-Klaus-Körper-Preis 2016, now Prof at U Leipzig)

D. Gallistl (2014-2016, U Bonn, now Full Prof at U Jena, ERC StG 2020)

D. L. Brown (2014-2015, U Bonn, then Assistant Prof at U Nottingham)

M. Eigel (2010-2013, HU Berlin, now WIAS Berlin)

phd students *J. Püschel* (since 2023, U Augsburg)

M. Hermann (since 2023, U Augsburg)

M. Deiml (since 2023, U Augsburg)

P. Reck (since 2022, U Augsburg)

H. Mohr (since 2022, U Augsburg)

C. Belponer (since 2021, joint with A. Caiazzo, U Augsburg/WIAS Berlin)

T. Neumeier (since 2020, joint with M. A. Peter, U Augsburg)

M. Hauck (2020-2023, U Augsburg, GAMM Dr.-Klaus-Körper-Prize 2024, now Chalmers University of Technology)

F. Kröpfl (2019-2024, U Augsburg)

R. Maier (2017-2020, U Augsburg, GAMM Junior 2020–22, Kulturpreis Bayern 2020, GAMM Dr.-Klaus-Körper-Prize 2021, Winner ECCOMAS PhD Olympiad 2021, now Assistant Professor at Karlsruher IT)

P. Morgenstern (2013-2017, U Bonn, GAMM Junior 2017–19, then at Leibniz U Hannover)

further researchers I have supported intensively in their early career phases: *P. Henning* (now Full Prof at Universität Bochum), *G. Li* (now Prof at U Hong Kong), *J. Gedicke* (now Full Prof at U Bonn), *M. Feischl* (now Full Prof at TU Vienna), *J. Wärnegård* (postdoc at Columbia U), *T. Sprekeler* (postdoc at NTU Singapore), *D. Wiedemann* (postdoc at TU Dortmund)

Ten Most Important Publications

- *Energy-adaptive Riemannian Optimization on the Stiefel Manifold*
  ESAIM: Mathematical Modelling and Numerical Analysis, 56:1629–1653, 2022
  (with R. Altmann and T. Stykel)
- *Operator compression with deep neural networks*
  Advances in Continuous and Discrete Models, 2022:29, 2022
  (with F. Kröpfl and R. Maier)
- *Localization and delocalization of ground states of Bose-Einstein condensates under disorder*
  SIAM Journal on Applied Mathematics, 82(1):330–358, 2022
  (with R. Altmann and P. Henning)
- *Sparse compression of expected solution operators*
  SIAM Journal on Numerical Analysis, 58(6): 3144–3164, 2020
  (with M. Feischl)
- *Sobolev gradient flow for the Gross-Pitaevskii eigenvalue problem: global convergence and computational efficiency*
  SIAM Journal on Numerical Analysis, 58(3):1744–1772, 2020
  (with P. Henning)
- *Quantitative Anderson localization of Schrödinger eigenstates under disorder potentials*
  Mathematical Models and Methods in the Applied Sciences, 30(5):917–955, 2020
  (with R. Altmann and P. Henning)
- *Computation of quasilocal effective diffusion tensors and connections to the mathematical theory of homogenization*
  Multiscale Modeling & Simulation, 15(4):1530–1552, 2017
  (with D. Gallistl)
- *Eliminating the pollution effect in Helmholtz problems by local subscale correction*
  Mathematics of Computation, 86:1005–1036, 2017
- *Adaptive analysis-suitable T-mesh refinement with linear complexity*
  Computer Aided Geometric Design 34:50–66, 2015
  (with P. Morgenstern)
- *Localization of elliptic multiscale problems*
  Mathematics of Computation 83:2583–2603, 2014
  (with A. Målqvist)