Georg Müller

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Personal Information

Date of Birth	April 10, 1988
Place of Birth	Berlin
Family Status	Married, 1 Child (born 07/2018)
Current Position	Senior Researcher (Ak. Oberrat), RG Scientific Computing and Optimization, University of Heidelberg

University Education

09/2013 – 05/2019	Doctoral studies in mathematics – University of Bayreuth (Anton Schiela) Focus: Optimal control of nonsmooth partial differential equations and complementarity constrained problems Thesis title: *"Optimal Control of Time-Discretized Contact Problems"* Grade: **Summa cum laude**
10/2010 – 03/2013	Graduate studies in scientific computing – TU Berlin Focus: Nonlinear optimization, optimal control of partial differential equations Minor: Physics M.Sc. grade: **1.0**
10/2007 – 11/2010	Undergraduate studies in mathematics – TU Berlin Focus: Differential equations Minor: Computer sciences / physics B.Sc. grade: **1.2**

Research Positions

since 08/2024	Assistant Professor (Ak. Oberrat), RG Scientific Computing and Optimization, University of Heidelberg
09/2021 – 07/2024	Assistant Professor (Ak. Rat), RG Scientific Computing and Optimization, University of Heidelberg
04/2018 – 08/2021	Research assistant, WG Numerical Optimization, University of Konstanz
09/2016 – 03/2018	Research assistant, Chair of Applied Mathematics, University of Bayreuth
10/2014 – 08/2016	Research assistant, Chair of Applied Mathematics, University of Bayreuth (BMBF project 'SOAK' - *"'Wear Simulation of Knee Implants and Shape Optimization for Patient-Group Specific Wear Minimization"'*)
09/2013 – 09/2014	Research assistant, Chair of Applied Analysis, Technical University of Hamburg-Harburg (BMBF project 'SOAK')
02/2011 – 02/2012 & 08/2012 – 03/2013	Student researcher, research group "'Nonlinear Optimization and Inverse Problems"', WIAS Berlin

Invited Research Stays

11/2019	Chair of Mathematical Optimization, TU Munich (with Lukas Hertlein and Michael Ulbrich)
06/2016	Research Group Numerical Mathematics, TU Chemnitz (with Gerd Wachsmuth and Roland Herzog)

Funding Proposals

01/2025	*"AI-Based, Multicriteria Bilevel Design Assistant for Low Payload Industrial Robots"*, DFG call for priority programme 2353; with Roland Herzog (Heidelberg); rejected, €265000
12/2021	*"Efficient solvers for life-cycle- and recycling models of roller bearings"*, BMBF call "Mathematics for Innovations"; with Peter Maaß (Bremen), Gabriele Steidl (Berlin), Christian Schenck (Bremen), Andreas Rademacher (Bremen); rejected, €766237
12/2021	*"AI-Based, Multicriteria Bilevel Design Assistant for Mechatronic Systems"*, DFG call for priority programme 2353; with Roland Herzog (Heidelberg); rejected, €225000
01/2021	*"Efficient Simulation of a Spatiotemporal SIR Model"*, UKN Zukunftskolleg call for Independent Research Grants; granted, €5825
10/2020 & 10/2019	*"Parameter Identification in Nonsmooth Systems Using Tailored Model Order Reduction"*, UKN Zukunftskolleg call for postdoctoral fellowship program; rejected
08/2020	*"Coordinated Policies for Epidemic Outbreaks with respect to Health, Economic and Social Implications"*, DFG call for multidisciplinary research into epidemics; with Stefan Volkwein (Konstanz), Michael Dellnitz and Sebastian Peitz (Paderborn), Christof Schütte and Tim Conrad (Berlin), rejected
10/2018	*"Multiobjective Optimization of Non-Smooth PDE-Constrained Problems"* (Collaboration), DFG priority programme 1962; with Stefan Volkwein (Konstanz), Michael Dellnitz and Sebastian Peitz (Paderborn), granted
07/2013	*"Shape Optimization for Induction Coils in Surface Hardening"*, PhD Scholarship, Berlin Mathematical School; granted but passed up, €35232

Teaching

WS 2024	Exercises and Organization for *Infinite-Dimensional Optimization* (Roland Herzog)
WS 2024	Organization for *Grundlagen der Optimierung* (Roland Herzog)
WS 2024	Seminar *Mathematical Machine Learning* with Roland Herzog
SS 2024	Exercises and Organization for *Lineare Algebra II* (Roland Herzog)
SS 2024	Teaching for *Help-Desk* (Interdisciplinary learning center)
WS 2023	Exercises and Organization for *Lineare Algebra I* (Roland Herzog)
WS 2023	Teaching for *Help-Desk* (Interdisciplinary learning center)
SS 2023	Exercises and Organization for *Nonlinear Optimization* (Roland Herzog)
SS 2023	Practicals *Software Praktika in der Optimierung* with Roland Herzog
WS 2022	Exercises and Organization for *Grundlagen der Optimierung* (Roland Herzog)
SS 2022	Seminar *Ausgewählte Kapitel der Optimierung* with Roland Herzog
SS 2022	Exercises and Organization for *Einführung in die Numerik* (Roland Herzog)
WS 2021	Exercises and Organization for *Grundlagen der Optimierung* (Roland Herzog)
SS 2021	Exercises and Organization for *Optimierung III* (Stefan Volkwein) with Luca Mechelli
WS 2020	Seminar *Advanced Methods in Optimization and Control* with Gabriele Ciaramella
WS 2020	Exercises and Organization for *Optimierung II* (Gabriele Ciaramella)
SS 2020	Seminar *Advanced Numerical Optimization Methods* with Gabriele Ciaramella
WS 2019	Exercises and Organization for *Optimierung II* (Stefan Volkwein)
SS 2019	Exercises and Organization for *Optimierung III* (Stefan Volkwein)
WS 2018	Exercises and Organization for *Optimierung II* (Stefan Volkwein) with Jianje Lu
SS 2018	Exercises and Organization for *Numerik Partieller Differentialgleichungen II* (Stefan Volkwein)
WS 2017	Exercises and Organization for *Analysis I* (Lars Grüne)
WS 2017	Teaching for *Lernzentrum* (Interdisciplinary learning center)
SS 2017	Exercises and Organization for *Analysis II* (Anton Schiela)
SS 2017	Teaching for *Lernzentrum* (Interdisciplinary learning center)
WS 2016	Exercises and Organization for *Analysis I* (Anton Schiela)
WS 2016	Teaching for *Lernzentrum* (Interdisciplinary learning center)

Theses Co-Advised (17 total)

07/2025	B.Sc.-thesis of Gero Brunke, *Sorting by Linear Programming* (with Roland Herzog)
04/2025	B.Sc.-thesis of Rebekka Bernard, *Lineare Kleinste-Quadrate-Aufgaben mit mehreren Modellen* (with Roland Herzog)
03/2025	B.Sc.-thesis of Johannes Kamlage, *Structural Optimization by Linear Programming* (with Roland Herzog)
01/2025	B.Sc.-thesis of Christian Reibold, *The Courant-Fisher Theorem from an Optimization Perspective* (with Roland Herzog)
01/2025	B.Sc.-thesis of Lukas Moritz, *Parser und Visualisierungstools für verteile LaTeX-Dokumente* (with Roland Herzog)
01/2025	M.Sc.-thesis of Johannes Manstein, *The Simplex Method on Manifolds* (with Roland Herzog and Peter Albers)
10/2024	M.Sc.-thesis of Mario Marić, *Preconditioned Solution in Nonlocal Optimal Control* (with Roland Herzog)
09/2024	B.Sc.-thesis of Martin Koloseus, *Single Line Image Approximation using Optimization Techniques* (with Roland Herzog)
12/2023	Ph.D.-thesis of Marco Bernreuther, *Nonsmooth PDEs: Efficient Algorithms, Model Order Reduction, Multiobjective PDE-Constrained Optimization* (with Stefan Volkwein)
07/2023	M.Sc.-thesis of Melissa Weber, *Dualität und Sensitivität in der linearen Optimierung* (with Roland Herzog)
07/2023	B.Sc.-thesis of Max Jungmann, *Convex Techniques in Stochastic Linear Programming* (with Roland Herzog)
03/2023	B.Sc.-thesis of Nico Haaf, *Optimal Control Problems with Measures* (with Roland Herzog and Evelyn Herberg)
03/2023	B.Sc.-thesis of Tomislav Popov, *A Survey of Generalized Convexity and Generalized Monotonicity* (with Roland Herzog)
12/2022	M.Sc.-thesis of Leonie Kreis, *Multilevel Training of Residual Neural Networks* (with Roland Herzog)
09/2019	M.Sc.-thesis of Marco Bernreuther, *RB-based PDE-Constrained Non-Smooth Optimization* (with Stefan Volkwein)
04/2019	M.Sc.-thesis of Hai-Dang Nguyen Pham, *SIR Model Simulation with FEniCS* (with Stefan Volkwein)
07/2016	M.Sc.-thesis of Matthias Stöcklein, *Optimal Control of Static Contact Problems in Linear Elasticity* (with Anton Schiela)

Reviews for

Computational Optimization and Applications
GAMM-Mitteilungen
SIAM Journal on Control and Optimization
International Journal of Numerical Analysis and Modeling

Organization

since 09/2021	*Seminar on Optimization*, University of Heidelberg, continuously
since 03/2022	*Heidelberg Seminar on Optimal Control*, Haus im Ennstal, Austria, anually
09/2025	15th European Conference on Numerical Mathematics and Advanced Applications (ENUMATH), Heidelberg
09/2023	6th European Conference on Computational Optimization (EUCCO), Heidelberg
12/2019	*Workshop on Model Order Reduction, Parameter Identification and Optimization with Nonsmooth Partial Differential Equations*, Konstanz

Peer-Reviewed Publications

1. Konstantin Sonntag et al. “A descent method for nonsmooth multiobjective optimization in Hilbert spaces”. In: *Journal of Optimization Theory and Applications* 203.1 (Sept. 2024), pp. 455–487. DOI: 10.1007/s10957-024-02520-4.
2. Gabriele Ciaramella, Felix Kwok, and Georg Müller. “A nonlinear optimized Schwarz preconditioner for elliptic optimal control problems”. In: *Domain Decomposition Methods in Science and Engineering XXVI*. Ed. by Susanne C. Brenner et al. Springer International Publishing, 2022, pp. 391–398. DOI: 10.1007/978-3-030-95025-5_41. arXiv: 2104.00274.
3. Marco Bernreuther, Georg Müller, and Stefan Volkwein. “Efficient scalarization in multiobjective optimal control of a nonsmooth PDE”. In: *Computational Optimization and Applications* (Aug. 2022). DOI: 10.1007/s10589-022-00390-y.
4. Marco Bernreuther, Georg Müller, and Stefan Volkwein. “Reduced basis model order reduction in optimal control of a nonsmooth semilinear elliptic PDE”. In: *Optimization and Control for Partial Differential Equations*. De Gruyter, Mar. 2022, pp. 1–32. DOI: 10.1515/9783110695984-001.
5. Constantin Christof and Georg Müller. “Multiobjective optimal control of a non-smooth semilinear elliptic partial differential equation”. In: *ESAIM: Control, Optimisation and Calculus of Variations* 27 (2021), S13. DOI: 10.1051/cocv/2020060.
6. Georg Müller. “Optimal Control of Time-Discretized Contact Problems”. PhD thesis. University of Bayreuth, 2019. urn: urn:nbn:de:bvb:703-epub-4379-0.
7. Constantin Christof and Georg Müller. “A note on the equivalence and the boundary behavior of a class of Sobolev capacities”. In: *GAMM-Mitteilungen* 40.3 (Mar. 2018), pp. 238–266. DOI: 10.1002/gamm.201730005.
8. Georg Müller and Anton Schiela. “On the control of time discretized dynamic contact problems”. In: *Computational Optimization and Applications* 68.2 (2017), pp. 243–287. DOI: 10.1007/s10589-017-9918-5.

Preprints and non Peer-Reviewed Publications

1. Bastian Dittrich et al. *A DC-reformulation for gradient-L^0-constrained problems in function spaces*. June 2025. arXiv: 2506.11917.
2. Gabriele Ciaramella, Michael Kartmann, and Georg Müller. *Solving semi-linear elliptic optimal control problems with L^1-cost via regularization and RAS-preconditioned Newton methods*. Nov. 2024. arXiv: 2411.00546.
3. Marco Bernreuther et al. *Multiobjective optimization of non-smooth PDE-constrained problems*. Aug. 2023. arXiv: 2308.01113.

Presentations

1. *The DC-Reformulation for L^0-Constrained Problems in Different Problem Settings*. 15$^{\text{th}}$ Heidelberg Seminar on Optimal Control, Haus im Ennstal, AT. Feb. 24, 2025.
2. *Schwarz-Preconditioned Newton for (slightly nonsmooth) Optimal Control of PDEs*. 13$^{\text{th}}$ Heidelberg Seminar on Optimal Control, Haus im Ennstal, AT. Feb. 28, 2023.
3. *Schwarz-Preconditioned Newton for (slightly nonsmooth) Optimal Control of PDEs*. Optimization Seminar, Heidelberg University. Jan. 19, 2023.
4. *Solving Semi-Linear Elliptic Optimal Control Problems with L^1-Cost via Regularization and RAS Preconditioned Newton*. FGP Conference on Optimization, University of Porto, PG. Feb. 5, 2022.
5. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. IWR Seminar Scientific Computing, IWR (University of Heidelberg) **(invited)**. June 16, 2021.
6. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. SIGOPT 2020 Conference on Optimization, TU Dortmund. Mar. 6, 2020.

7. *An Introduction to Version Control Using Git*. Seminar on Numerics, University of Konstanz. Dec. 17, 2019.
8. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. Workshop on Optimal Control, University of Konstanz. Dec. 3, 2019.
9. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. Special Semester on Optimization, Johan Radon Institute for Computational and Applied Mathematics, Linz, AT. Nov. 26, 2019.
10. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. Seminar of the International Research Training Group IGDK Munich – Graz, TU Munich **(invited)**. Nov. 21, 2019.
11. *Multiobjective Optimal Control of a Non-Smooth Semi-Linear Elliptic PDE*. 6th International Conference on Continuous Optimization, TU Berlin. Aug. 7, 2019.
12. *Improved Gradient Descent Schemes and the Barzilai-Borwein Method*. Seminar on Numerics, University of Konstanz. July 23, 2019.
13. *Optimal Control of Time Discretized Dynamic Contact Problems*. GAMM annual meeting, TU Munich. Mar. 20, 2018.
14. *Optimal Control of Time Discretized Contact Problems*. SIAM Conference on Optimization, Vancouver, CA. May 23, 2017.
15. *Boundary Behavior of Sobolev Capacities and Implications for Contact Problems*. 9th Chemnitz Seminar on Optimal Control, Haus im Ennstal, AT. Feb. 14, 2017.
16. *Optimal Control of Time Discretized Contact Problems*. Research Center for Modeling and Simulation (MODUS), University of Bayreuth. June 27, 2016.
17. *Optimal Control of Time Discretized Contact Problems*. Seminar on Scientific Computing, TU Chemnitz **(invited)**. June 21, 2016.
18. *Optimal Control of Time Discretized Dynamic Contact Problems*. GAMM / DMV annual meeting, TU Braunschweig. Mar. 8, 2016.
19. *Optimal Control of Dynamic Contact – Modelling, Stationarity and Application*. 8th Chemnitz Seminar on Optimal Control, Haus im Ennstal, AT. Feb. 29, 2016.
20. *Optimal Control of Dynamic Contact and Application to Knee Joint Prostheses*. 6th Conference on High Performance Scientific Computing, Hanoi, VN. Mar. 19, 2015.
21. *Optimal Control of Dynamic Contact and Application to Knee Joint Prostheses*. 7th Chemnitz Seminar on Optimal Control, Haus im Ennstal, AT. Feb. 25, 2015.

Programming Languages

C, C++	advanced
Python	advanced
Fortran	basic

Software Used

Mathematical Tools	Matlab, DUNE, Kaskade7, FEniCS, Latex
Version Control	Git, SVN
Visualization	Paraview, Gnuplot
Operating Systems	Linux, Windows
Website Development	Hugo, HTML
Software Development	Make, CMake

Languages

German	Native speaker
English	Very good command

Miscellaneous

07/2025	Mentoring and participation in the Integrative Think Tank 2025
01/2024	Implementation of a linear optimization based scheduler (LOBS) for tutor-to-class scheduling assignments
Since 2022	Co-development and administration of our WG-website
09/2019	Fall School *"Quasi-Variational Inequalities: Theory, Algorithms, and Applications"*, Würzburg
04/2018 – 12/2018	Technology Transfer Liaison position at the University of Konstanz
07/2016	Grading the mathematics competition of the 11th Day of Mathematics, University of Bayreuth
07/2015	Co-Supervision of the lab "Planetary Orbits on the Computer" – 10th Day of Mathematics, University of Bayreuth
08/2014	Gene Golub SIAM Summer School – *"Simulation, Optimization, and Identification in Solid Mechanics"*, RICAM, Linz, AT
03/2012 – 07/2012	MATHEON Technology Transfer Internship, Ingenieursgesellschaft Auto und Verkehr (IAV)
08/2004 – 06/2005	Stay abroad at Kettering High-School, Waterford, Michigan, USA

Georg Müller, Heidelberg, 09. 07. 2025