

HANNES MEINLSCHMIDT

Substitute Professor (W3) for Mathematical Modelling, TU Clausthal
Assistant Professor (W1) for Applied Analysis, FAU Erlangen-Nürnberg (on leave)

CONTACT

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RESEARCH PROFILE

My research revolves around the interface of analysis of PDEs and optimal control. I am often motivated by optimal control problems subject to strongly nonlinear (coupled systems of) evolution equations, or real-world applications with nonsmooth data. In order to deal with these, I often need to develop new techniques in optimal control and associated functional analysis and PDE results. This includes regularity theory for elliptic and parabolic equations and systems, maximal parabolic regularity techniques and global-in-time existence issues for nonlinear problems. I also work on nonlinear dispersive equations and optimal control theory in general.

PROFESSIONAL EXPERIENCE

Substitute Professor (W3) “Mathematische Modellierung” 10/26–today
Technische Universität Clausthal, Germany

Assistant Professor (W1) “Applied Analysis” 03/21–today
Department of Mathematics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany

- On leave since 10/26 for the substitute professorship at TU Clausthal
- Associated to the “Chair of Dynamics, Control, Machine Learning and Numerics (Alexander von Humboldt Professorship)” of Enrique Zuazua

Research Scientist / Postdoctoral Researcher 09/17–02/21
Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences, Linz, Austria

- Group “Optimization and Control” of Karl Kunisch
- Lecturer at Johannes Kepler Universität Linz

Postdoctoral Researcher & Lecturer 04/17–08/17
Department of Mathematics, TU Darmstadt, Germany

- Group “Nonlinear Optimization” of Stefan Ulbrich

Scientific Collaborator & Teaching Assistant 10/11–03/17
Department of Mathematics, TU Darmstadt, Germany

- Group “Nonlinear Optimization” of Stefan Ulbrich

EDUCATION

Dr. rer. nat. (Mathematics), TU Darmstadt

10/11–03/17

- Dissertation: “Analysis and Optimal Control of Quasilinear Parabolic Evolution Equations in Divergence Form on Rough Domains”
- Final grade: *summa cum laude* (“mit Auszeichnung bestanden”)
- Advisor: Stefan Ulbrich

Diploma (Mathematics, minor Computer Science), TU Darmstadt

04/05–08/11

- Final grade: *very good* (average grade 1.0)

AWARDS

Award for outstanding scientific achievements, for the best dissertation in mathematics in 2017 (2 500 €), awarded by the Vereinigung von Freunden der Technischen Universität zu Darmstadt e.V. (05/18)

FUNDING

DFG Sachbeihilfe, “Renormalized solutions in optimal control”, project no. 551486487 (overall budget 239 468 €) (10/25–)

DAAD Project-Related Personal Exchange (PPP) CAPES with Brazil, “Control and numerical analysis of complex systems”, subproject *Optimal control of the nonlinear Schrödinger equation* (overall budget 29 041 €, personal budget 4 335 €) (2024–25)

Sino-German Mobility Programme, “Control, inversion and numerics for Partial Differential Equations (CIN-PDE)”, subproject *Strichartz type boundary estimates for boundary control of nonlinear wave equations on domains* (overall budget 178 310 €, personal budget 3 850 €) (2022–25)

PUBLICATIONS

Selected publications; a complete list is available at www.meinlschmidt.eu/publications.

Submitted

- [11] H. Meinlschmidt and J. Rehberg. *Sharp angle estimates for second order divergence operators*. Submitted, 2026. arXiv:2510.23450
- [10] H. Meinlschmidt. *Nonautonomous maximal parabolic regularity for nonsmooth quasilinear parabolic systems*. Submitted, 2025. arXiv:2312.13852

Journal articles and book chapters

- [9] L. Bonifacius, F. Hoppe, H. Meinlschmidt, and I. Neitzel. *Optimal control of quasilinear parabolic PDEs with gradient terms and pointwise constraints on the gradient of the state*. Mathematical Control and Related Fields 15(4):1284–1319, 2025. doi:10.3934/mcrf.2025037
- [8] F. Hoppe, H. Meinlschmidt, and I. Neitzel. *Global-in-time solutions for quasilinear parabolic PDEs with mixed boundary conditions in the Bessel scale*. Evolution Equations and Control Theory 13(5):1250–1286, 2024. doi:10.3934/eect.2024025
- [7] H. Meinlschmidt and J. Rehberg. *Extrapolated elliptic regularity and application to the van Roosbroeck system of semiconductor equations*. Journal of Differential Equations 280:375–404, 2021. doi:10.1016/j.jde.2021.01.032
- [6] R. Chill, H. Meinlschmidt, and J. Rehberg. *On the numerical range of second-order elliptic operators with mixed boundary conditions in L^p* . Journal of Evolution Equations 21:3267–3288, 2020. doi:10.1007/s00028-020-00642-6
- [5] K. Kunisch and H. Meinlschmidt. *Optimal control of an energy-critical semilinear wave equation in 3D with spatially integrated control constraints*. Journal de Mathématiques Pures et Appliquées 138:46–87, 2020. doi:10.1016/j.matpur.2020.03.006

- [4] D. Horstmann, H. Meinlschmidt, and J. Rehberg. *The full Keller–Segel model is well-posed on nonsmooth domains*. Nonlinearity 31:1560–1592, 2018. doi:10.1088/1361-6544/aaa2e1
- [3] H. Meinlschmidt, C. Meyer, and J. Rehberg. *Optimal control of the thermistor problem in three spatial dimensions, part 1: Existence of optimal solutions*. SIAM Journal on Control and Optimization 55(5):2876–2904, 2017. doi:10.1137/16M1072644
- [2] H. Meinlschmidt, C. Meyer, and J. Rehberg. *Optimal control of the thermistor problem in three spatial dimensions, part 2: Optimality conditions*. SIAM Journal on Control and Optimization 55(4):2368–2392, 2017. doi:10.1137/16M1072656
- [1] H. Meinlschmidt and J. Rehberg. *Hölder-estimates for non-autonomous parabolic problems with rough data*. Evolution Equations and Control Theory 5(1):147–184, 2016. doi:10.3934/eect.2016.5.147

SUPERVISION

PhD students

P. Blöss-Braga, PhD project “Renormalized solutions in optimal control” (funded by the DFG) (10/25–)

C. Lange, PhD project “Optimal control of Fokker–Planck equations with irregular data” (scholarship of the Evangelisches Studienwerk Villigst) (12/23–)

TEACHING

Funktionalanalysis (TU Clausthal)	W 26/27
Partielle Differentialgleichungen (TU Clausthal)	W 26/27
Diskretisierung und Numerische Optimierung	S 26
Numerik optimaler Steuerungen	S 26, S 24, S 23
Optimization with Partial Differential Equations	W 25/26, W 23/24, W 22/23
Mathematik C1–C3 für Ingenieure (lecture series)	W 25/26, S 25, W 24/25
Advanced Algorithms for Nonlinear Optimization	W 23/24
Partielle Differentialgleichungen I & II	S 22, W 21/22
A Primer on Functional-Analytic Methods for PDE	S 21
Optimization in Function Spaces (JKU Linz)	W 20/21
Optimization in Function Spaces (TU Darmstadt)	S 17

INVITED PRESENTATIONS

Selection of 31 talks in total.

Optimal Control of Nonlinear Parabolic PDEs. SIAM Conference on Optimization, Edinburgh, Scotland, 06/26.

Quasilinear parabolic equations in the Bessel scale. Berliner Oberseminar Nichtlineare partielle Differentialgleichungen (Langenbach-Seminar), WIAS, Berlin, Germany, 03/26.

Optimal control of quasilinear parabolic PDEs with gradient constraints. Viennese Conference on Optimal Control and Dynamic Games, Vienna, Austria, 07/25.

Including gradients in optimal control of quasilinear parabolic equations. French-German-Spanish Conference on Optimization, Gijón, Spain, 06/24.

Renormalized solutions for optimal control of the drift in Fokker–Planck equations. Berliner Oberseminar Nichtlineare partielle Differentialgleichungen (Langenbach-Seminar), WIAS, Berlin, Germany, 11/23.

Optimal control of a semilinear critical wave equation. MFO Workshop “Challenges in Optimization with Complex PDE-Systems”, online, 02/21.

Optimal control of the 3D thermistor problem. MFO Workshop “Challenges in Optimal Control of Nonlinear PDE-Systems”, Oberwolfach, Germany, 04/18.

SERVICE

Institutional service

Steering committee “Erlanger Promotionsprogramm Mathematik und Data Science”, Department of Mathematics, FAU Erlangen-Nürnberg (2022–)

Deputy member, Studienzuschusskommission Mathematik, Department of Mathematics, FAU Erlangen-Nürnberg (2021–)

Appointed member of the department council, Department of Data Science, FAU Erlangen-Nürnberg (2021–23)

Organization of scientific events

Minisymposium “PDE-Constrained Optimization: Theory and Numerics”, SIAM Conference on Optimization 2026 (with Constantin Christof), 6 speakers (06/26)

Section S19 “Optimization with Differential Equations”, GAMM e.V. Annual Meeting 2024 (with Anne-Therese Rauls-Ehlert), 40 speakers (03/24)

Session “Optimal and Feedback Control of PDEs”, 6th European Conference on Computational Optimization (EUCCO) (with Daniel Walter), 16 speakers (09/23)

Memberships

GAMM activity group “Optimization with Differential Equations”

Refereeing

Reviewer for FONDECYT grants. More than 25 reviews for journals and books, for example for AOT, ESAIM:COCV, JMAA, JOTA, MCRF, NM, OMS, SICON, Springer.