Johannes Milz

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Last update: June 28, 2023

Contents

I Earned Degrees

Doctorate (**Dr. rer. nat.**), Applied Mathematics (passed with highest distinction), June 2021
Technical University of Munich, Germany

Master of Science, Mathematics in Science and Engineering (passed with distinction), October 2017
Minors: Mechanical and Electrical Engineering
Technical University of Munich, Germany

Non-degree seeking student, enrolled in Master's program *Computational Science and Engineering* (GPA 4.0)
School of Mathematics, Georgia Institute of Technology, Atlanta, GA, August 2016 – May 2017

Bachelor of Science, Applied Mathematics, September 2015
Minors: Physics and Electrical Engineering
Technical University of Munich, Germany

II Employment History

Assistant Professor
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology, Atlanta, GA
January 2023 – present

Postdoctoral Researcher
Department of Mathematics, Technical University of Munich, Germany
August 2021 – December 2022
Advisor: Michael Ulbrich

Research Associate (with Teaching Responsibilities)
Department of Mathematics, Technical University of Munich, Germany
September 2017 – July 2021
Advisor: Michael Ulbrich

Member of the International Research Training Group IGDK 1754 Munich – Graz
March 2018 – August 2021

Graduate Research Assistant
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology, Atlanta, GA
Project: *Convexity and quasi-convexity of monotone dynamical systems*
January 2017 – May 2017
Advisor: Andy Sun

Electrical Engineer (part time)
IAV Automotive Engineering, Munich, Germany
October 2014 – June 2016

III Honors and Awards

International or National Awards

Graduate and Undergraduate Academic Awards and Scholarships

- Germany's National Scholarship, German Ministry of Ed. Res. and IBM, Germany, 2017
- Hurwitz Award for Excellent Completion of Master's Degree, Hurwitz Society, Technical University of Munich, Germany, 2017

IV Research, Scholarship, and Creative Activities

A Published Books, Book Chapters, and Edited Volumes

no data

B Refereed Publications and Submitted Articles

B.1 Published and Accepted Journal Articles

5. ⋆ Johannes Milz and Thomas M. Surowiec. Asymptotic consistency for nonconvex risk-averse stochastic optimization with infinite dimensional decision spaces. preprint, https://arxiv.org/abs/2207.14756, July 2022, accepted for publication in Math. Oper. Res., June 2023
4. Johannes Milz. Consistency of Monte Carlo estimators for risk-neutral PDE-constrained optimization. *Appl. Math. Optim.*, 87(57), 2023. doi:10.1007/s00245-023-09967-3
3. Johannes Milz. Sample average approximations of strongly convex stochastic programs in Hilbert spaces. *Optim. Lett.*, 17:471–492, 2023. doi:10.1007/s11590-022-01888-4
2. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust PDE-constrained optimization. *SIAM J. Control Optim.*, 60(3):1410–1435, 2022. doi:10.1137/20M134664X
1. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust nonlinear optimization. *SIAM J. Optim.*, 30(3):1996–2025, 2020. doi:10.1137/19M1263121

B.2 Conference Presentation with Proceedings (Refereed)

no data

B.3 Other Refereed Material

no data

B.4 Submitted Journal Articles (with Date of Submission)

2. Johannes Milz and Michael Ulbrich. Sample size estimates for risk-neutral semilinear PDE-constrained optimization. preprint, https://arxiv.org/abs/2207.14755, July 2022
1. Johannes Milz. Reliable error estimates for optimal control of linear elliptic PDEs with random inputs. preprint, https://arxiv.org/abs/2206.09160, June 2022,

B.5 Journal Articles in Preparation

2. Johannes Milz and Daniel Walter. Monte Carlo estimators for risk-neutral, nonsmooth optimal control with applications to bang-bang problems, 2023
1. Johannes Milz. Consistency of sample-based critical points for risk-neutral PDE-constrained optimization, 2023

C Other Publications and Creative Products

C.1 Open-Source Computer Code and Software

3. Johannes Milz. FW4PDE: Frank–Wolfe algorithms for PDE-constrained optimization, 2022. URL: https://github.com/milzj/FW4PDE
2. Johannes Milz. sNewton4PDEOpt: A semismooth Newton method for elliptic PDE-constrained optimization, Dec. 2022. URL: https://github.com/milzj/sNewton4PDEOpt
1. Johannes Milz. MPBNGCInterface.jl: A Julia interface for interfacing the multiobjective proximal bundle method MPBNGC, 2019. URL: https://github.com/milzj/MPBNGCInterface.jl

C.2 Dissertations

3. Johannes Milz. *Topics in PDE-Constrained Optimization under Uncertainty and Uncertainty Quantification*. Dissertation, Technical University of Munich, Munich, 2021. URL: https://nbn-resolving.de/urn/resolver.pl?urn:nbn:de:bvb:91-diss-20210618-1584169-1-9, Advisor: Michael Ulbrich, Committee members: Michael Ulbrich, Karl Kunisch (University of Graz, Austria), Alexander Shapiro (Georgia Institute of Technology)
2. Johannes Milz. *A Structure Exploiting Solution Method for Convex Optimal Control Problems and Numerical Examples*. Master's thesis, Technical University of Munich, Munich, 2017
1. Johannes Milz. *Asymptotic Properties of Least-Squares Estimators in Linear Models*. Bachelor's thesis, Technical University of Munich, Munich, 2015. URL: https://mediatum.ub.tum.de/1274055?id=1274055&change_language=en

D Presentations

D.1 Invited Conference and Workshop Presentations

6. Johannes Milz and Michael Ulbrich. Sample size estimates for risk-neutral semilinear PDE-constrained optimization. 2023 SIAM Conference on Optimization (OP23), Seattle, WA, May 31, 2023. Part of Minisymposium "PDE-Constrained Optimization with Nonsmooth Structures or under Uncertainty". URL: https://meetings.siam.org/sess/dsp_talk.cfm?p=129264
5. Johannes Milz. Consistency of Monte Carlo estimators for risk-neutral PDE-constrained optimization. Computational Methods in Applied Mathematics (CMAM 2022), Technical University of Vienna, Vienna, Austria, August 2022 – September 2022. URL: https://www.asc.tuwien.ac.at/cmam2022/?id=abstracts
4. Johannes Milz and Michael Ulbrich. A smoothing method for distributionally robust nonlinear optimization with applications to PDE-constrained problems. DMV Annual Meeting (virtual), Chemnitz, Germany, September 2020
3. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust optimization with PDEs. Annual Colloquium of the Research Training Group IGDK 1754, Augsburg, Germany, November 2019
2. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust optimization with PDEs. Sixth International Conference on Continuous Optimization (ICCOPT), Berlin, Germany, August 2019
1. Johannes Milz and Michael Ulbrich. Approximation scheme for distributionally robust nonlinear optimization. Annual Colloquium of the Research Training Group IGDK 1754, Graz, Austria, November 2018

D.2 Invited Seminar Presentations

2. Johannes Milz. Consistency of Monte Carlo estimators for risk-neutral PDE-constrained optimization. Optimization in Oslo (OiO) Seminar, Simula Research Laboratory, Oslo, Norway, December

21, 2022. URL to abstract: https://thomas-surowiec.github.io/adverts/johannes-milz-advert.pdf, URL to video: https://www.youtube.com/watch?v=r8iMfiyTIRc

1. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust PDE-constrained optimization. Research Seminar, Institute of Mathematics and Scientific Computing, University of Graz, Austria, November 2019

D.3 Contributed Conference and Workshop Presentations (Refereed Abstracts)

3. Johannes Milz. Design of renewable tidal turbine farms under model parameter uncertainty. IISE Annual Conference & Expo 2023, New Orleans, LA, May 22, 2023
2. Johannes Milz. Reliable finite element error estimates for optimal control of elliptic PDEs with random inputs. 91st GAMM Annual Meeting (virtual), Kassel, Germany, March 2021. URL: https://gamm202021.de/images/Dateien/bookofabstracts2021.pdf
1. Johannes Milz and Michael Ulbrich. An approximation scheme for distributionally robust nonlinear optimization. 90th GAMM Annual Meeting, Vienna, Austria, February 2019. URL: https://jahrestagung.gamm-ev.de/wp-content/uploads/2020/07/GAMM2019_BookofAbstracts.pdf

D.4 Other Presentations

6. Johannes Milz, *Optimization of complex physical systems under uncertainty: Why and how*, PhD visit days, Georgia Insitute of Technology, March 10, 2023
5. Johannes Milz, *Reliable Error Estimates for Optimal Control of Affine-Linear PDEs with Random Inputs*, IGDK 1754 Graduate Seminar, Technical University of Munich, Germany, January 2021, (virtual)
4. Johannes Milz, *Exponential Tail Bounds for Monte Carlo and Multilevel Monte Carlo Mean Estimators in a Class of Smooth Banach Spaces*, Chair of Mathematical Optimization, Department of Mathematics, Technical University of Munich, Germany, May 28, 2020 (virtual)
3. Johannes Milz, *Sample Average and Finite Element Approximation*, IGDK 1754 Graduate Seminar, Technical University of Munich, Germany February 2020
2. Johannes Milz, *Cubic Regularization for Optimization Problems in Hilbert Spaces*, IGDK 1754 Graduate Seminar, Technical University of Munich, Germany, May 2019
1. Johannes Milz, *Robust and Distributionally Robust Optimization* IGDK 1754 Graduate Seminar, Technical University of Munich, Germany, January 2019

E Grants and Contracts

no data

F Other Scholarly and Creative Accomplishments

no data

G Societal and Policy Impacts

no data

H Other Professional Activities

H.1 Research Visits

4. George Mason University, Fairfax, VA, June 11, 2023 – June 16, 2023, invited by Harbir Antil
3. Simula Research Laboratory, Oslo, Norway, December 19, 2022 – December 22, 2022, invited by Thomas M. Surowiec

2. Philipps-Universität Marburg, Germany, March 13, 2022 – March 18, 2022, invited by Thomas M. Surowiec
1. University of Graz, Austria, August 19, 2019 – December 20, 2019, Research Stay within Mobility Period of the Research Training Group IGDK 1754, invited by Karl Kunisch

V Education

A Courses Taught

Semester, Year	Course Number	Course Title	# students	CIOS
Spring, 2023	ISyE 6663	Nonlinear Optimization	15	4.7

The last column is the interpolated median of the student responses to the question "Considering everything, the instructor was an effective teacher" in the Course-Instructor Opinion Survey (CIOS). The maximum score is 5, the minimum score is 1.

B Individual Student Guidance

no data

B Individual Student Guidance (Technical University of Munich)

B.1 Ph.D. Students

no data

B.2 Master's Students Co-Advised (Technical University of Munich)

2. Oliver Heinzel
   Advisor: Michael Ulbrich
   Degree Program: Mathematics
   Thesis title: Risk-measure-based PDE-constrained optimization under uncertainty
   Semester: Summer 2021–Fall 2021

1. Anastasia Boykova
   Advisor: Michael Ulbrich
   Degree Program: Mathematics
   Thesis title: Fourier Phase Retrieval via Low-Rank Riemannian Optimization Methods
   Semester: Fall 2018–Spring 2019

B.3 Bachelor's Students Co-Advised (Technical University of Munich)

3. Olena Melnikov
   Advisor: Michael Ulbrich
   Degree Program: Mathematics
   Thesis title: Regularized Newton Methods for Convex Optimization
   Semester: Summer 2022

2. Florian Hübler
   Advisor: Michael Ulbrich
   Degree Program: Mathematics
   Thesis title: Nonconvex Distributed Learning with Compression
   Semester: Fall 2021

1. Adrian Klein

Advisor:	Michael Ulbrich
Degree Program:	Mathematics
Thesis title:	A Survey of Methods and an Implementation of an Algorithm for Nonlinear Semidefinite Programming and Numerical Examples
Semester:	Fall 2018–Spring 2019

C Educational Innovations and Other Contributions

C.1 Interdisciplinary Teaching Training Courses Attended

- *Storytelling for Teaching in Higher Education*, ProfiLehrePlus, University of the Bundeswehr Munich, Germany, February 2021 (virtual)
- *Certificate for Teaching in Higher Education of the Bavarian Universities* (foundation level), Technical University of Munich, Germany, 2020
- *Teaching Skills* (K290), Sprachraum, University of Munich, Germany, July 2020 (virtual)
- *Designing and Conducting Examinations* (K230), ProLehre, Technical University of Munich, Germany (virtual), July 2020

C.2 Additional Teaching Experience

- Instructor, *Introduction to Software Tools for Nonlinear Programming*, three-day, extracurricular course, Fall 2018, Spring 2020, Spring 2021, Technical University of Munich, Germany
- Master's students' mentor, *Case Studies on Nonlinear Optimization* (MA4513), Project: Robot Cell Optimization, Technical University of Munich, Germany, Cooperation with Siemens AG, Munich
- Teaching assistant, *Nonlinear Optimization* (MA3503), Fall 2020, Fall 2021, *Nonsmooth Optimization* (MA5510), Spring 2018, *Real Analysis for Electrical Engineers* (MA9412), Fall 2017, Spring 2018, Technical University of Munich, Germany

VI Service

A Professional Contributions

A.1 Editorial Board Memberships

no data

A.2 Society Offices, Activities, and Membership

- Memberships
  - Society for Industrial and Applied Mathematics (SIAM)
    - (Early Career) Professional Member, 2023–present
    - Student Member, 2016–2021
  - Institute for Operations Research and the Management Sciences (INFORMS), 2023–Present
  - Mathematical Optimization Society (MOS), 2023–Present
  - Institute for Industrial and Systems Engineers (IISE), 2023–present

A.3 Organization and Chairmanship of Technical Sessions, Workshops and Conferences

- Session Chair

1. "Physical and Financial Performance Analysis of Energy Systems," IISE Annual Conference & Expo 2023, New Orleans, LA, May 20–23, 2023

A.4 Technical Journal Referee Activities (No. manuscripts reviewed, not including revisions reviewed)

- SIAM Journal on Scientific Computing (1)
- ESAIM: Control, Optimisation and Calculus of Variations (1)
- Journal of Differential Equations (1)
- IEEE Transactions on Signal Processing (1)

A.5 Proposal Panels and Reviews

no data

A.6 Other Involvement

- IISE Doctoral Colloquium 3 Minute Pitch Competition, *Judge*, IISE Annual Conference & Expo 2023, New Orleans, LA, May 21, 2023

B Public and Community Service

B.1 Outreach to K-12 Students

- Conducted and organized an activity session on *Exploration - Exploitation* for 23 high school students during the *2023 Probability and Statistics High School Competition* jointly with Shubhada Agrawal and Diego Cifuentes held at Georgia Tech in March 2023.

C Institute Contributions

C.1 School Committee Service

- Graduate Student Admission Committee, 2022–present

C Institute Contributions (Technical University of Munich)

- Spokesperson of the graduate students of the Research Training Group IGDK 1754, 2019 – 2021, Initiated four compact courses and co-organized three compact courses held by internationally renowned researchers
- Compiled Book of Abstracts for 89th GAMM (Association of Applied Mathematics and Mechanics) Annual Meeting (with Lukas Hertlein), Technical University of Munich, Germany, 2018