Dr. Marvin Fritz

Personal Data

Place, Date of Birth:	Heilbronn, Germany | 28 July 1992
Email:	marvin.fritz@tum.de
Website:	https://fritz-io.github.io/
Preprints:	http://arxiv.org/a/fritz_m_1

Education

2018 – 2022 | Doctoral Studies (Dr. rer. nat.) in Mathematics
- **University:** Technical University of Munich
- **Thesis:** Well-posedness of nonlocal and mixed-dimensional phase-field models applied to tumor growth
- **Supervisor:** Prof. Dr. Barbara Wohlmuth
- **Grade:** Cum Laude

2015 – 2017 | Master of Science (M.Sc.) in Mathematics
- **University:** Technical University of Munich
- **Thesis:** The recent existence proofs of the Navier-Stokes equations
- **Supervisor:** Prof. Dr. Hans-Wilhelm Alt
- **Grade:** Magna Cum Laude (1.2)

2012 – 2015 | Bachelor of Science (B.Sc.) in Mathematics
- **University:** Technical University of Munich
- **Thesis:** On the stability of relative equilibrium solutions in vortex dynamics
- **Supervisor:** Prof. Dr. Jürgen Scheurle
- **Grade:** Cum Laude (2.2)

Work Experience

04/22 – 06/22 | Technical University of Munich
- **Job:** Postdoctoral researcher at the Chair for Numerical Mathematics
- **Task:** Analysis of time-fractional PDEs

01/18 – 04/22 | Technical University of Munich
- **Job:** PhD Student at the Chair for Numerical Mathematics
- **Task:** Analysis and numerical treatment of nonlinear evolutionary PDEs

06/18 – 07/18 | University of Texas at Austin
- **Job:** Guest researcher at the Institute of Computational Engineering and Sciences, invited by Prof. J. Tinsley Oden
- **Task:** Analysis and numerical treatment of tumor growth models

03/16 – 09/17 | Technical University of Munich
- **Job:** Student assistant
- **Task:** Tutoring students and correcting assignments in Analysis and Linear Algebra for Computer Scientists

03/16 – 04/16 | Serlo Education, Munich
- **Job:** Internship
- **Task:** Building a learning platform for students with Javascript

08/16 – 09/16 | Océ Printing Systems, Poing
- **Job:** Internship
- **Task:** Numerical treatment of the Nernst-Planck-Poisson equation, describing the evolution of liquid toners in an electrical field

Scholarships and Awards

Nov. 2020	Best Journal Article of 2019 in M3AS (World Scientific)
Jul. 2018	Best Study Award by Hurwitz-Gesellschaft
2016–2017	Deutschlandstipendium

Publications

2022 | Equivalence between a time-fractional and an integer-order gradient flow: The memory effect reflected in the energy
- **Co-Authors:** Ustim Khristenko, Barbara Wohlmuth
- **Journal:** submitted
- **Link:** https://arxiv.org/abs/2106.10985

2021 | A 1D-0D-3D coupled model for simulating blood flow and transport processes in breast tissue
- **Co-Authors:** Tobias Köppl, J. Tinsley Oden, Andreas Wagner, Barbara Wohlmuth, Chengyue Wu
- **Journal:** International Journal for Numerical Methods in Biomedical Engineering
- **Link:** https://doi.org/10.1002/cnm.3612

2022 | Time-fractional Cahn-Hilliard equation: Well-posedness, degeneracy, and numerical solutions
- **Co-Authors:** Mabel L. Rajendran, Barbara Wohlmuth
- **Journal:** Computer & Mathematics with Applications
- **Link:** https://doi.org/10.1016/j.camwa.2022.01.002

2021 | Modeling and simulation of vascular tumors embedded in evolving capillary networks
- **Co-Authors:** Prashant K. Jha, Tobias Köppl, J. Tinsley Oden, Andreas Wagner, Barbara Wohlmuth
- **Journal:** Computer Methods in Applied Mechanics and Engineering
- **Link:** https://doi.org/10.1016/j.cma.2021.113975

2021 | On a subdiffusive tumour growth model with fractional time derivative
- **Co-Authors:** Christina Kuttler, Mabel L. Rajendran, Laura Scarabosio, Barbara Wohlmuth
- **Journal:** IMA Journal of Applied Mathematics
- **Link:** https://doi.org/10.1093/imamat/hxab009

2020 | Analysis of a new multispecies tumor growth model coupling 3D phase-fields with a 1D vascular network
- **Co-Authors:** Prashant K. Jha, Tobias Köppl, J. Tinsley Oden, Barbara Wohlmuth
- **Journal:** Nonlinear Analysis: Real World Applications
- **Link:** https://doi.org/10.1016/j.nonrwa.2021.103331

2019 | Local and nonlocal phase-field models of tumor growth and invasion due to ECM degradation
- **Co-Authors:** Ernesto Lima, Vanja Nikolic, J. Tinsley Oden, Barbara Wohlmuth
- **Journal:** Mathematical Models and Methods in Applied Sciences
- **Link:** https://doi.org/10.1142/S0218202519500519

2019 | On the unsteady Darcy-Forchheimer-Brinkman equation in local and nonlocal tumor growth models
- **Co-Authors:** Ernesto Lima, J. Tinsley Oden, Barbara Wohlmuth
- **Journal:** Mathematical Models and Methods in Applied Sciences
- **Link:** https://doi.org/10.1142/S0218202519500325

2018 | Well-Posedness and Numerical Treatment of the Blackstock Equation in Nonlinear Acoustics
- **Co-Authors:** Vanja Nikolić, Barbara Wohlmuth
- **Journal:** Mathematical Models and Methods in Applied Sciences
- **Link:** https://doi.org/10.1142/S0218202518500550

Talks and Conferences

04/22 | IntComSin (Interfaces, Complex Structures, and Singular Limits)
Place: Universität Regensburg
Talk: Well-posedness of mixed-dimensional and nonlocal phase-field models of Cahn-Hilliard type applied to tumor growth

09/21 | DMV-ÖMG Annual Conference
Place: Universität Passau
Talk: On the time-fractional Cahn-Hilliard equation applied to tumor growth

07/21 | 16th U.S. National Congress on Computational Mechanics
Place: University of Illinois at Urbana-Champaign
Talk: Phase field models of the growth of tumors embedded in an evolving vascular network: Dynamic 1D-3D models of angiogenesis

07/21 | YIC (VI ECCOMAS Young investigators conference) 2021
Place: Universitat Politecnica de Valencia
Talk: Analysis of a mixed-dimensional tumor growth model

03/21 | SIAM Conference on Computational Science and Engineering
Place: Fort Worth
Talk: Analysis of the time-fractional Cahn–Hilliard equation

08/20 | SMB (Society for Mathematical Biology) 2020 Annual Meeting
Place: Universität Heidelberg
Talk: Analysis of a multispecies tumor growth models coupling 3D phase-fields with a 1D vascular network

03/20 | International Workshop on Recent Developments in Modelling, Analysis and Simulation of Processes in Porous Media
Place: Friedrich-Alexander-Universität Erlangen-Nürnberg
Talk: On the unsteady Darcy–Forchheimer–Brinkman equation in tumor growth models

11/17 | Oberseminar Angewandte Analysis
Place: Technische Universität Dortmund
Talk: On the solvability of the 3D Navier–Stokes equations

08/17 | Oberseminar Simulation and Uncertainty Quantification
Place: Technical University of Munich
Talk: On the solvability of the 3D Navier–Stokes equations

10/15 | Oberseminar Dynamische Systeme
Place: Technical University of Munich
Talk: On the stability of relative equilibria in vorticity dynamics

Workshops

Oct. 2021 | Nonlocality in Analysis, Numerics and Applications
Place: Lorentz Center

Jun. 2021 | Hausdorff School on: Trending Tools for the Solvability of Nonlocal Elliptic and Parabolic Equations
Place: Hausdorff Center for Mathematics

Apr. 2021 | Hausdorff School on Diffusive Systems: Pattern Formation, Bifurcations, and Biological Application
Place: Hausdorff Center for Mathematics

Feb. 2021 | Workshop: Mathematical and Computational Materials Science
Place: IMSI Institute for Mathematical and Statistical Innovation

Feb. 2021	Winterschool on Analysis and Applied Mathematics **Place:** Universität Münster
Mar. 2019	OCIP 2019: Workshop on Numerical Methods for Optimal Control and Inverse Problems **Place:** Technical University of Munich
Sep. 2018	Workshop on Advanced Computational Modeling for Tumor Growth Prediction **Place:** Technical University of Munich

Teaching

04/16 – 09/16	Bachelor Seminar: Fractal Structures in Mathematics and Nature **Place:** Technical University of Munich **Task:** Organization of seminar and supervising student projects
04/17 – 09/17	Linear Algebra for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework
10/16 – 03/17	Analysis for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework
04/16 – 09/16	Linear Algebra for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework

Supervised student projects

2021	R. Koch (Bachelor's thesis) **Topic:** On the numerical discretization of the time-fractional Lotka–Volterra equation
2021	N. Nebulishvili (Master's thesis) **Topic:** On the Lattice–Boltzmann method applied to the time-fractional Cahn–Hilliard equation
2020	C. Feistner (Bachelor's thesis) **Topic:** Time integration methods for the Cahn–Hilliard equation
2019	L.-M. Kauck (Seminar project) **Topic:** Complex Newton method
2019	P. A. Wolfmeier (Seminar project) **Topic:** Continuous but nowhere differentiable functions

Computer Skills

`C/C++`, R, Python, `MATLAB`, LaTeX, FEniCS, `libMesh`

Languages

German (C2), English (B2+/C1), Spanish (A2), Latin (Latinum)

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(typeset in LaTeX)