Dr. Marvin Fritz

Personal Data

Place, Date of Birth:	Heilbronn, Germany | 28 July 1992
Email:	marvin.fritz@tum.de
Website:	https://www.marvinfritz.de
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

WS19	Bachelor Seminar: Fractal Structures in Mathematics and Nature **Place:** Technical University of Munich **Task:** Organization of seminar and supervising student projects
SS17	Linear Algebra for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework
WS16	Analysis for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework
SS16	Linear Algebra for Computer Scientists **Place:** Technical University of Munich **Task:** Tutoring students and correcting homework

Supervised student projects

2022	J. Stolz (Bachelor's thesis) **Topic:** Implementation and analysis of a partial differential equation model of tumor-immune dynamics with chemotaxis
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)

(typeset in LaTeX)