

Felix Scholz

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Personal information

Date of birth	18.11.1988 in Frankfurt am Main, Germany
Nationality	German
Spoken languages	German (first language), English (fluent), Spanish (advanced), French (intermediate), Japanese (elementary)

Professional Experience

Since March 2022	University assistant (6 years position) , <i>JKU Linz</i> , Austria, Institute of Applied Geometry.
December 2020 – February 2022	Researcher (Postdoc) , <i>Waseda University</i> , Tokyo, Research Institute for Science and Engineering. Team for Advanced Flow Simulation and Modeling (TAFSM)
August 2019 – November 2020	Researcher (Postdoc) , <i>Johann Radon Institute for Computational and Applied Mathematics</i> , <i>Austrian Academy of Sciences</i> , Linz, Austria.
September 2016 – July 2019	Researcher (PhD Student) , <i>Johann Radon Institute for Computational and Applied Mathematics</i> , <i>Austrian Academy of Sciences</i> , Linz, Austria.

Education

- September 2016 – July 2019 **PhD in mathematics**, *Johannes Kepler Universität Linz*, Austria.
- April 2012 – May 2014 **Master of Science in mathematics**, *Freie Universität Berlin*, Germany.
- September 2010 – January 2011 **Exchange semester**, *ENS Lyon*, France.
with the Erasmus program
- October 2008 – September 2012 **Bachelor of Science in mathematics**, *Freie Universität Berlin*, Germany.
Minor subject: Philosophy

Awards

- September 2021 **Best paper award (1st place)** of the Symposium on Solid and Physical Modeling 2021. Paper: Felix Scholz, Takashi Maekawa. *Accurate High-Order Derivatives of Geodesic Paths on Smooth Surfaces*
- September 2019 **Early Research Achievement Award** of the Johannes Kepler University Linz, *For excellent research during the PhD studies*

Third-party funding

- December 2020 – May 2022 **Linz Institute of Technology (LIT) Seed Project**, *PDE-aware isogeometric discretization based on neural networks*, 108,631€, Project partner Thomas Takacs (RICAM)

Programming

- C++: Developer for the open-source isogeometric analysis C++-library G+Smo (<https://github.com/gismo>)
- Python, PyTorch: Deep learning for geometric modeling

Theses

- Doctoral Thesis *Efficient Matrix Assembly for Isogeometric Analysis*, supervised by Univ.-Prof. Dr. Bert Jüttler
- Master's thesis *Convexity properties of hypersurfaces under mean curvature flow*, supervised by Prof. Dr. Klaus Ecker
- Bachelor's thesis *Structure of three-dimensional manifolds with positive Ricci curvature*, supervised by Prof. Dr. Klaus Ecker

Peer-reviewed publications

- [1] F. Scholz, S. Nishikawa, M. Takezawa, and T. Maekawa, "Approximation of doubly curved surfaces by analysis-suitable piecewise surfaces with high developability," *The Visual Computer*, pp. 1–18, 2022.
- [2] C. L. Chan, F. Scholz, and T. Takacs, "Locally refined quad meshing for linear elasticity problems based on convolutional neural networks," *Engineering with Computers*, vol. 38, no. 5, pp. 4631–4652, 2022.
- [3] M. Pan, B. Jüttler, and F. Scholz, "Efficient matrix computation for isogeometric discretizations with hierarchical B-splines in any dimension," *Computer Methods in Applied Mechanics and Engineering*, vol. 388, p. 114 210, 2022.
- [4] T. Maekawa and F. Scholz, "Accurate higher order derivatives of curvature and torsion of geodesic curves on freeform surfaces (application to geodesic grid models)," in *31st Design & Systems conference (2021)*, In Japanese, Japan Society of Mechanical Engineers, 2021, p. 3307.
- [5] F. Scholz and T. Maekawa, "Accurate high-order derivatives of geodesic paths on smooth surfaces," *Computer-Aided Design*, vol. 140, p. 103 082, 2021, **Best paper award (1st place)** of the Symposium on Solid and Physical Modeling 2021.
- [6] F. Scholz and B. Jüttler, "Using high-order transport theorems for implicitly defined moving curves to perform quadrature on planar domains," *SIAM Journal on Numerical Analysis*, vol. 59, no. 4, pp. 2138–2162, 2021.
- [7] F. Scholz and B. Jüttler, "Parameterization for polynomial curve approximation via residual deep neural networks," *Computer Aided Geometric Design: Special issue for GMP 2021*, vol. 85, p. 101 977, 2021.
- [8] F. Scholz and B. Jüttler, "Numerical integration on trimmed three-dimensional domains with implicitly defined trimming surfaces," *Computer Methods in Applied Mechanics and Engineering*, vol. 357, 2019.
- [9] F. Scholz, A. Mantzaflaris, and B. Jüttler, "First order error correction for trimmed quadrature in isogeometric analysis," in *Advanced Finite Element Methods with Applications, Selected Papers from the 30th Chemnitz Finite Element Symposium 2017*, T. Apel, U. Langer, A. Meyer, and O. Steinbach, Eds., ser. Lecture Notes in Computational Science and Engineering, Springer International Publishing, 2019.
- [10] A. Mantzaflaris, F. Scholz, and I. Touloupoulos, "Low-rank space-time decoupled isogeometric analysis for parabolic problems with varying coefficients," *Computational Methods in Applied Mathematics*, vol. 19.1, pp. 123–136, 2018.
- [11] F. Scholz, A. Mantzaflaris, and B. Jüttler, "Partial tensor decomposition for decoupling isogeometric Galerkin discretizations," *Computer Methods in Applied Mechanics and Engineering*, vol. 336, pp. 485 –506, 2018.

Conference and workshop presentations

- 23.9.2022 *High-order numerical integration for trimmed Isogeometric Analysis.* International Conference on Subdivision, Geometric and Algebraic Methods, Isogeometric Analysis and Refinability in Italy (SMART). Rimini, Italy
- 17.9.2022 *High-Order Numerical Integration for Trimmed Isogeometric Analysis and Locally refined quad meshing based on convolutional neural networks,* CHANGE workshop, Obergurgl, Austria
- 31.7.-5.8.2022 *Efficient Numerical Integration for Trimmed Isogeometric Analysis based on Error Correction.* Invited presentation at the minisymposium *CAD-based discretization methods* at WCCM-APCOM 2022, Yokohama, Japan (online)
- 14.7.2022 *High-Order Numerical Integration for Unfitted Finite Element Methods and Trimmed Isogeometric Analysis.* Workshop on Adaptive Methods and Novel Discretization Techniques in Continuum Mechanics. Salzburg, Austria
- 24.6.2022 *Locally refined quad meshing based on convolutional neural networks.* Curves and Surfaces. Arcachon, France
- 27.9.2021 *Using High-Order Transport Theorems for Implicitly Defined Moving Curves to Perform Quadrature on Planar Domains,* 9th International Conference on Isogeometric Analysis, Online
- 27.9.2021 *Accurate High-Order Derivatives of Geodesic Paths on Smooth Surfaces,* Symposium on Solid and Physical Modeling (SPM 2021), Online
- 12.5.2021 *Parameterization for Polynomial Curve Approximation via Residual Deep Neural Networks,* International Conference on Geometric Modeling and Processing (GMP 2021), Online
- 19.9.2019 *Numerical integration on trimmed three-dimensional domains with implicitly defined trimming surfaces,* 7th International Conference on Isogeometric Analysis, Munich, Germany
- 27.8.2019 *Numerical integration on trimmed three-dimensional domains with implicitly defined trimming surfaces,* 8th CMAPT Workshop, St. Wolfgang, Austria
- 3.7.2018 *First order correction terms for trimmed quadrature in isogeometric analysis,* Curves and Surfaces, Arcachon, France
- 24.4.2018 *Low-rank space-time decoupled isogeometric analysis for parabolic problems with varying coefficients,* Isogeometric Analysis and Applications, Delft, Netherlands
- 1.2.2018 *Efficient matrix generation for multipatch TT-domains,* CHANGE Workshop, Leysin, Switzerland

- 26.9.2017 *Partial tensor decomposition for decoupling isogeometric Galerkin discretizations*, 30th Chemnitz FEM Symposium, St. Wolfgang, Austria
- 13.9.2017 *Partial tensor decomposition for decoupling isogeometric Galerkin discretizations*, 5th International Conference on Isogeometric Analysis, Pavia, Italy
- 2.2.2017 *Partial tensor decomposition in isogeometric analysis*, G+Smo developer days, Delft, Netherlands

Teaching experience

- Summer semester 2023 (scheduled) Lecture on “Higher Differential Geometry”, 2 hours/week, JKU Linz
- Summer semester 2023 (scheduled) Lecture on “Introduction to Topology”, 2 hours/week, JKU Linz
- Winter semester 2022/2023 Lecture on “Discrete Differential Geometry”, 2 hours/week, JKU Linz
- Winter semester 2022/2023 Lecture on “Descriptive Geometry”, 2 hours/week, JKU Linz
- Summer semester 2022 Lecture on “Geometric methods for mechanical engineers”, 3 hours/week, JKU Linz
- Summer semester 2018 Exercise class on “Isogeometric Analysis: Geometric Design and Numerical Simulation”, 1 hour/week, JKU Linz

Responsibilities

- Minisymposium organization *Geometric Design Learning* at SIAM Conference on Computational Geometric Design 2023
- Reviewer for *Computer aided design*, *Computer aided geometric design*, *Journal of computational and applied mathematics*, *Mathematics and Computers in Simulation*