Jakob Zech

Curriculum Vitae

✉ *jzech@mit.edu*
Google Scholar: link
WWW: link

Education

July 2014 –Dec. 2018 **PhD in Mathematics**, *Seminar for Applied Mathematics, ETH Zürich*, PhD thesis: "Sparse-Grid Approximation of High-Dimensional Parametric PDEs", link, Date of defense: 10 Dec. 2018, Supervisor: Prof. Dr. Christoph Schwab.

Sept. 2012 –July 2014 **Master in Applied Mathematics**, *ETH Zürich*, Passed with distinction, Grade Point Average: 5.88 (best grade: 6, passing grade: 4). Master's thesis: "A Posteriori Error Estimation of *hp*-DG Finite Element Methods for Highly Indefinite Helmholtz Problems", link, Supervisor: Prof. Dr. Stefan Sauter.

Oct. 2008 –March 2012 **Bachelor in Mathematics in Science and Technology**, *Vienna University of Technology*, Passed with distinction, Grade Point Average: 1.1 (best grade: 1, passing grade: 4). Bachelor's Thesis: "Fehlerabschätzungen bei der Fast Multipole Methode", Supervisor: Prof. Jens Markus Melenk, PhD.

Employment

April 2019 –March 2020 **Postdoc**, *Department of Aeronautics and Astronautics, Massachusetts Institute of Technology*, Advisor: Prof. Youssef Marzouk, PhD.

July 2014 –March 2019 **PhD Student/research assistant**, *Seminar for Applied Mathematics, ETH Zürich*, Supervisor: Prof. Dr. Christoph Schwab.

July 2007 –March 2008 **Caritas Vorarlberg: Werkstätte Ludesch**, Compulsory paid community service, Care of persons with intellectual disabilities.

Scholarships

April 2019 **Early Postdoc.Mobility fellowship**, *18 months, Swiss National Science Foundation.*

Sept. 2010 **Leistungsstipendium**, *Vienna University of Technology.*

Published Papers

2020 **Convergence rates of high dimensional Smolyak quadrature**, J. Zech and Ch. Schwab, to appear in *Mathematical Modelling and Numerical Analysis.* (2020).

2020 **Domain Uncertainty Quantification in Computational Electromagnetics**, R. Aylwin, C. Jerez-Hanckes, Ch. Schwab and J. Zech, to appear in *SIAM/ASA J. Uncertain. Quantif.* (2020).

July 2019 **Uncertainty Quantification for Spectral Fractional Diffusion: Sparsity Analysis of Parametric Solutions**, L. Herrmann, Ch. Schwab and J. Zech, *SIAM/ASA J. Uncertain. Quantif.*, Vol. 7, No. 3, 913–947. (2019), link.

July 2019 **Multilevel approximation of parametric and stochastic PDEs**, J. Zech, D. Dung and Ch. Schwab, *Math. Models Methods Appl. Sci. 29*, Vol. 29, No. 9, 1753–1817 (2019) link.

Aug. 2018 **Deep learning in high dimension: neural network expression rates for generalized polynomial chaos expansions in UQ**, Ch. Schwab and J. Zech, *Analysis and Applications*, Vol. 17, No. 1, pp. 19-55 (2019), link.

March 2018 **Shape Holomorphy of the Stationary Navier–Stokes Equations**, A. Cohen, Ch. Schwab and J. Zech, *SIAM Journal on Mathematical Analysis*, Vol. 50, No. 2, pp. 1720-1752 (2018), link.

Sept. 2017 **Electromagnetic wave scattering by random surfaces: Shape holomorphy**, C. Jerez-Hanckes, Ch. Schwab and J. Zech, *Mathematical Models and Methods in Applied Sciences*, Vol. 27, No. 12, pp. 2229-2259 (2017), link.

Oct. 2015 **A posteriori error estimation of *hp*-dG finite element methods for highly indefinite Helmholtz problems**, S. Sauter and J. Zech, *SIAM Journal on Numerical Analysis*, Vol. 53, No. 5, pp. 2414-2440 (2015), link.

Preprints

Jan. 2020 **Deep ReLU Neural Network ExpressionRates for Data-to-QoI Maps in BayesianPDE Inversion**, L. Herrmann, Ch. Schwab and J. Zech, Technical report 2020-02, Seminar for Applied Mathematics, ETH Zürich, link.

July 2019 **Exponential ReLU DNN expression of holomorphic maps in high dimension**, J. A. A. Opschoor, Ch. Schwab and J. Zech, Technical report 2019-50, Seminar for Applied Mathematics, ETH Zürich, link.

Academic Projects

March 2014 **A Posteriori Error Estimation of *hp*-DG Finite Element Methods for Highly Indefinite Helmholtz Problems**, *ETH Zürich/Universität Zürich*, Master's thesis on a residual based a posteriori error estimator for the Helmholtz equation that is explicit in the wavenumber, Supervisor: Prof. Dr. Stefan Sauter, link.

Sept. 2013 **Nonlinear *n*-term approximation for the solution of the Dirichlet problem**, *ETH Zürich*, Semester thesis on nonlinear n-term approximation and approximation spaces for the solution of the Dirichlet problem, Supervisors: Dr. Markus Hansen and Prof. Dr. Christoph Schwab, link.

Aug. 2011 **Fehlerabschätzungen bei der Fast Multipole Methode**, *Vienna University of Technology*, Bachelor's thesis, theoretical and applied study of the error caused by the re-expansions occuring in the fast multipole method for the Helmholtz equation in three dimensions, Supervisor: Prof. Jens Markus Melenk, PhD.

Miscellaneous

Programming Languages

Scientific computing	Maple, Matlab, R
Programming	Python, C/C++ (basics), MPI (basics), OpenMP (basics)
Office	LaTeX

Languages

German	Native
English	Fluent
French	Intermediate (A2-B1)