



# Maximilian Bernkopf

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🏠 maximilianbernkopf.github.io/math/

📺 MaximilianBernkopf

🌐 maximilianbernkopf

🎓 Google Scholar

## Summary

I am a project assistant and PhD candidate under the supervision of Jens Markus Melenk in the doctoral program Dissipation and Dispersion in Nonlinear PDEs funded by the FWF at TU Wien.

My research interest is concerned with numerical discretizations of time-harmonic wave propagation problems in a high frequency regime as well as least squares finite element methods with focus on minimal regularity assumptions on the data.

Besides that and due to my financial mathematics background I am interested in the connection to stochastics. Further interests of mine are the broad field of data science and machine learning. I gained my initial data science experience working at start-ups in Vienna.

## Education

### PhD Candidate in Computational Mathematics

TU WIEN

Vienna, Austria

09/2017-current

- Doctoral thesis: "Finite Element Analysis of the Heterogeneous Helmholtz Equation and Least Squares Methods"
- Supervisor: Prof. Jens Markus Melenk, PhD

### Dipl.-Ing. (equivalent MSc) in Financial and Actuarial Mathematics

TU WIEN

Vienna, Austria

11/2015-06/2016

- Master thesis: "Analysis of the alpha-hypergeometric stochastic volatility model"
- Supervisor: Prof. Dr. Stefan Gerhold

### BSc in Financial and Actuarial Mathematics

TU WIEN

Vienna, Austria

07/2011-11/2015

### Matura (High school graduation equivalent)

SCHOTTENGYMNASIUM

Vienna, Austria

10/2002-06/2010

## Work Experience

### Data Scientist

INTRABASE

Vienna, Austria

09/2016-09/2017

- Focus on statistical learning and outlier detection.
- Development of statistical algorithms for unsupervised outlier detection.
- High dimensional anomaly detection of categorical and numerical data.

### Data Scientist

MANTIGMA

Vienna, Austria

08/2016-09/2017

- Focus on time series analysis and supervised learning.
- Account balance forecasting for retail banking.
- Electricity demand forecasting utilizing classical mathematical time series models as well as novel deep learning techniques.
- Machine learning based credit scoring models.

### Research Assistant

TU WIEN, RESEARCH UNIT OF FINANCIAL AND ACTUARIAL MATHEMATICS

Vienna, Austria

10/2015-06/2016

- Focus on credit risk models and their implementation.

### Internship

FMA FINANZMARKTAUFSICHT ÖSTERREICH

Vienna, Austria

09/2013-12/2013

- Focus on Solvency II.

### Community Service / Paramedic

ARBEITER-SAMARITER-BUND

Vienna, Austria

12/2010-08/2011

## Research Stays

### Université Polytechnique Hauts-de-France

WORKING WITH PROF. DR. SERGE NICAISE

Valenciennes, France

09/2020-12/2020

### Universität Zürich

WORKING WITH PROF. DR. STEFAN SAUTER

Zürich, Switzerland

09/2019-12/2019

## Teaching

### Tutor - Analysis 1

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

03/2021-current

### Seminar Instructor - Seminar on inverse problems

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

03/2019-07/2019

### Seminar Instructor - Seminar on uncertainty quantification and approximation theory of neural networks

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

10/2018-02/2019

### Tutor - Analysis 1-3

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

10/2017-02/2019

### Tutor - Computer Mathematics

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

03/2016-07/2016

### Tutor - Computer Mathematics

TU WIEN, INSTITUTE OF ANALYSIS AND SCIENTIFIC COMPUTING

Vienna, Austria

03/2015-07/2015

## Publications

- [5] Wavenumber-explicit stability and convergence analysis of  $hp$  Finite Element discretizations of Helmholtz problems in piecewise smooth media, in preparation  
M. Bernkopf, T. Chaumont-Frelet, J. M. Melenk  
2021
- [4] Optimal convergence rates in  $L^2$  for a first order system least squares finite element method. Part II: inhomogeneous boundary conditions, in preparation  
M. Bernkopf, J. M. Melenk  
2021
- [3] Solvability of Discrete Helmholtz Equations, submitted  
M. Bernkopf, S. Sauter, C. Torres, A. Veit  
arXiv e-prints arXiv:2105.02273, 2021
- [2] Optimal convergence rates in  $L^2$  for a first order system least squares finite element method. Part I: homogeneous boundary conditions, submitted  
M. Bernkopf, J. M. Melenk  
arXiv e-prints arXiv:2012.12919, 2020
- [1] Analysis of the  $hp$ -Version of a First Order System Least Squares Method for the Helmholtz Equation  
M. Bernkopf, J. M. Melenk  
*Advanced Finite Element Methods with Applications: Selected Papers from the 30th Chemnitz Finite Element Symposium 2017*, 2019

## Skills

<b>R</b>	tidyverse (dplyr, ggplot2, tibble, purrr, readr etc.), dbplyr, data.table, shiny, forecast, caret, tidymodels, plotly, rmarkdown
<b>Python</b>	ngsolve, numpy, pandas, matplotlib, scipy, sklearn
<b>Proficient in</b>	Matlab, Maple, Mathematica, LaTeX
<b>Basic Knowledge of</b>	Hugo, C, C++, Java
<b>Languages</b>	German (native), English (fluent), Russian (basic)
<b>Operating System of Choice</b>	Linux + i3wm

## Hobbies and Random Bits

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<b>Sports</b>	Calisthenics, Climbing, Bouldering, Gymnastics & Acrobatics
<b>Non-athletic Hobbies</b>	Dancing, Reading stoic philosophy, Non-modern Art, Listening to audiobooks at 2x the speed
<b>Less Usefull Skills</b>	Juggling, Yoyo-tricks, Solving the Rubiks cube
<b>Guilty Pleasures</b>	Selfimporvement books, Reddit, Memes, Cheese
<b>Random Facts</b>	Can fit at least three Soletti sideways in his mouth, Dyed his hair blond to be Son Goku for Halloween, Google Local Guide Level 7, Weirdly enthusiastic about his Dyson