Markus Wess

Numerical Simulation
Scientific Software Engineer (PhD)

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markus-wess

Profile

Computational Scientist with a PhD in Numerical Mathematics, specializing in PDE-based modeling and high-performance simulation of physical problems. Experienced in developing scalable and efficient scientific software for finite element methods using C++/Python for electromagnetic wave propagation problems. Translating advanced mathematical methods into efficient computational tools.

Technical Skills

Programming Python, C++, Matlab

Methods Finite Element Methods, Numerical Linear Algebra, Geometric Modeling and Meshing

Algorithms Iterative Solvers, Eigenvalue Solvers, Krylow Methods, Time-Stepping

Tools Git, Linux/Unix environments, Profiling

Libraries Netgen/NGSolve, OCC, PETSc, NumPy, SciPy, Pandas

Professional Experience

2022–Present **Postdoctoral Researcher**, *TU Wien, Institute of Analysis and Scientific Computing*, Vienna, Austria

- International collaboration on the development and implementation of DG-methods for time-domain electromagnetic wave propagation simulations (+100M unknowns/second on conventional desktop hardware, *ngsolve.github.io/dcm*)
- Developed and implemented highly parallelizable, memory efficient eigenvalue algorithms (+10M unknowns on conventional desktop hardware)

2020–2022 **Postdoctoral Researcher**, *ENSTA / INRIA-funded project*, Paris, France

- Acquired competitive funding for an international postdoctoral research project
- Theoretical results for stability and convergence absorbing layers for anisotropic and dispersive wave problems with applications to metamaterials

2014–2020 **Research Associate (PhD Researcher)**, *TU Wien, Institute of Analysis and Scientific Computing*, Vienna, Austria

- Implemented and maintained perfectly matched layers in the open source FE-package NGSolve (C++)
- Developed competitive algorithms for non-linear eigenvalue problems
- Published new family o

Education

2014–2020 **PhD in Computational Mathematics**, *TU Wien*, Vienna, Austria
PhD thesis on numerical methods for wave propagation and finite element simulation

2011–2014 **MSc in Technical Mathematics**, *TU Wien*, Vienna, Austria
Focus on applied mathematics, numerical analysis and scientific computing

2007–2011 **BSc in Technical Mathematics**, *TU Wien*, Vienna, Austria

Language Skills

German	Native
English	Fluent (written and spoken)
French	Basic
Russian	Basic

Selected Publications

- (2025) **Radial perfectly matched layers and infinite elements for the anisotropic wave equation.** *SIAM Journal on Mathematical Analysis*
- (2024) **Mass lumping the dual cell method to arbitrary polynomial degree for acoustic and electromagnetic waves.** *Journal of Computational Physics*
- (2023) **A Krylov eigenvalue solver based on filtered time-domain solutions.** *Computers & Mathematics with Applications*

Teaching & Scientific Communication

- Organized and conducted lectures from specialized master's courses to large scale (+300 students) basic math classes, supervised Bachelor's and Master's theses
- Presented research at international conferences and gave outreach talks
- (Co-)organized scientific conferences, peer review for high-impact scientific journals (SIAM, Journal of Computational Physics)

Personal Interests

Sports	Long-distance running (regional and national competition level), ultra-cycling
Music	Trumpet (selected admission for Jazz trumpet at Konservatorium Wien), guitar, piano