

Dr. Manuel Baumann

Curriculum Vitæ

Summary

Applied mathematician and R&D software engineer with 10+ years of experience in scientific computing, numerical methods, and industrial research. Proven track record in translating advanced research into production-grade solutions in electromagnetic simulation, MRI reconstruction, and energy systems. Experienced in C++, HPC, and technical leadership.



Professional Experience

2022–Present **SIMULIA R&D Software Engineering Manager**, *Dassault Systèmes*, Darmstadt.

CST Studio Suite is a high-performance 3D analysis software package for designing, analyzing and optimizing electromagnetic components and systems. I work on algorithmic development in C++ for the time-domain solver of CST, the primary tool used by over 70% of our customers.

- **Project lead:** Solver-accurate electromagnetic field interpolation
 - Implementation of fast and robust numerical algorithms in C++
 - Technical consultancy for high-performance computing customers
- **Researcher:** Physics-informed deep learning
 - Integrate data-driven deep learning methods with numerical simulations in Python
 - Build AI-based surrogate models for electrical machine applications

2023–Present **Lecturer**, *Technical University of Darmstadt*.

Teaching weekly lectures on the "Introduction to Scientific Computing in C++" (5 ECTS). This Master-level course covers advanced topics of C++ and presents practical computational science applications with an emphasis on scientific software development.

- Design of course material and exercises
- Modern teaching approach using live-coding and code submits in GitLab
- Course topics: object-oriented programming · parallelization · external libraries OpenMP/Eigen

2020–2022 **Research Scientist**, *Philips Research*, Hamburg.

Development of magnetic resonance (MR) image reconstruction techniques. Translation of basic research on MR Fingerprinting into industrial production. As a result, a GPU-accelerated MR Fingerprinting implementation has been included in the Philips reconstruction framework.

- **BMBF project:** MR-guided high-intensity focused ultrasound therapy for pancreatic cancer
- **Research highlights:**
 - Fast reconstruction: Implementation of real-time 3D MR Fingerprinting using CUDA
 - Fast acquisition: Dixon water/fat separation for undersampled image acquisitions
 - Robust imaging: Motion detection and motion correction for abdominal MR Fingerprinting
- **From research into practice:** Supported preclinical studies at University Hospital Cologne
- **Co-inventor** of patent application EP4137834A1 on MR Fingerprinting research

Academic Background

2018–2020 **Postdoctoral Researcher**, *Max Planck Institute for Dynamics of Complex Technical Systems*, Magdeburg.

Development of mathematical models and efficient algorithms for the simulation and control of power grid networks with respect to renewable energy sources, flexible consumers and new storage devices.

- **BMBF project:** Consistent Optimization and Stabilization of Electric Power Grids
- **Research focus:**
 - Complexity reduction of dynamic power flow simulations based on network clustering
 - Surrogate models for coupled microgrids using neural networks
 - Mathematical expertise: numerical optimization · model-order reduction · approximation methods · machine learning
- **From research into practice:** Replacing an expensive two-level optimization framework by a fast pre-trained neural network at our industry partner ENSO NETZ GmbH

2013–2018 **Doctoral Researcher**, *Delft University of Technology*.

Theory and implementation of numerical linear algebra algorithms for the efficient computer simulation of seismic wave propagation.

- **PhD thesis:** *Fast Iterative Solution of the Time-Harmonic Elastic Wave Equation at Multiple Frequencies* (2018)
- **Research focus:**
 - Development of fast and memory-efficient numerical solvers for large-scale linear systems
 - Implementation of a coupled Python/Fortran 90 software framework
 - Mathematical expertise: matrix computations · mathematical modelling · differential equations · finite-element method
- **Highlights:** Publication of five peer-reviewed journal publications and several contributions to international conferences

Education

2012–2013 **Master of Science**, *Delft University of Technology*.

Applied Mathematics · Topic of Master thesis: Nonlinear model-order reduction

2011–2012 **Master of Science**, *KTH Royal Institute of Technology*.

Computational Science & Engineering · Major: High-performance computing

2008–2011 **Bachelor of Science**, *Technical University of Berlin*.

Mathematics · Topic of Bachelor thesis: Simulation and control of mixtures in a stirrer

2007–2011 **Bachelor of Science**, *Technical University of Berlin*.

Engineering Sciences · Topic of Bachelor thesis: Computational fluid dynamics using CUDA

Awards and Study Scholarships

- 2016 SIAM Certificate of Recognition for founding the first Dutch SIAM Student Chapter at TU Delft
- 2011–2013 Two-year Erasmus Mundus study scholarship awarded by the European Commission
- 2011 Award for Best Bachelors Thesis in Mathematics at TU Berlin
- 2007–2011 Study scholarship awarded by the Friedrich Ebert Foundation

Supervision of Students

- 2024 Celine Reddig, Research internship and MSc Thesis at Dassault Systèmes
Accurate Field Interpolation for the Finite Integration Technique within Hexahedral Cells
- 2021 David Heesterbeek, Research internship at Philips Research
Mathematical Optimization of MR Fingerprinting Sequences
- 2019 Frances Weiß, MSc Thesis at Max Planck Institute
Simulation, Analysis, and Model Order Reduction for Dynamic Power Network Models

Languages

German	Native	
English	Fluent	<i>Extensive experience in English-speaking work environments</i>
Dutch	Advanced	<i>Lived and studied abroad for five years</i>
French	Intermediate	<i>Reading and comprehension at C1 level</i>

Interests

race cycling · outdoor activities · skiing instructor · traveling



Darmstadt, August 25, 2026