Dr. Manuel Baumann

Curriculum Vitæ

About myself

Date of birth	04-10-1986
Birth place	Berlin
Nationality	German
Education	PhD in Applied Mathematics

Experience

2020–Present   **Research Scientist in Computational Imaging**, *Philips Research*, Hamburg.

Magnetic Resonance (MR) Fingerprinting for quantitative imaging of the pancreas.

- BMBF project: MR-guided high-intensity focused ultrasound therapy for pancreatic cancer
- Research highlights: Key developments include:
  - Implementation of real-time multi-slice MR Fingerprinting using C++/CUDA.
  - Integration of water/fat separation for spiral, undersampled acquisitions.
  - Motion detection and motion correction for abdominal MR Fingerprinting.
- Project partners University Hospital Cologne · Soluxx GmbH · Profound Medical GmbH

2018–2019   **Postdoctoral Researcher**, *Max Planck Institute for Dynamics of Complex Technical Systems*, Magdeburg.

Development of mathematical models and fast algorithms for the simulation and control of power grids with respect to renewable energy sources, flexible consumers and new storages.

- BMBF project: Consistent Optimization and Stabilization of Electric Power Grids
- Research focus: Mathematical modelling and software development in Python.
  - Complexity reduction of dynamic power flow simulations exploiting network clustering.
  - Surrogate models for coupled microgrids using neural networks.
  - Mathematical expertise: numerical optimization · network simulation · control systems and theory · artificial intelligence.
- Industrial partners TenneT TSO · ENSO NETZ · Venios GmbH · Energy Saxony e.V.

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

- PhD thesis: *Fast Iterative Solution of the Time-Harmonic Elastic Wave Equation at Multiple Frequencies*
- Research focus: Theory and implementation of numerical linear algebra algorithms for the efficient computer simulation of seismic waves.
  - Development of fast and memory-efficient solvers for large-scale linear systems in a coupled Python/Fortran 90 environment.
  - Mathematical expertise: finite element method · numerical simulation · mathematical optimization· inverse problems.
- Industrial partner: Shell Global Solutions International B.V.

Education

2012–2013   **Master of Science**, *Delft University of Technology*, Delft.
Applied Mathematics · Topic of the Master thesis: Nonlinear model-order reduction

2011–2012   **Master of Science**, *KTH Royal Institute of Technology*, Stockholm.
Computational Science & Engineering · Major: High-performance computing

2008–2011   **Bachelor of Science**, *Technical University of Berlin*, Berlin.
Mathematics · Topic of the Bachelor thesis: Simulation and control of mixtures in a stirrer

2007–2011   **Bachelor of Science**, *Technical University of Berlin*, Berlin.
Engineering Sciences · Topic of the Bachelor thesis: Computational fluid dynamics with CUDA

Selected scientific publications

2021   *On the effect of fat spectrum complexity in Dixon MR Fingerprinting.* In: Proc. Intl. Soc. Mag. Reson. Med., with M. Doneva, E. Huaroc, D. Karampinos

2020   *MR Fingerprinting with water-fat separation.* In: Philips Technical Report PR-TN 2020/00257, with M. Doneva

2019   *Replacing distributed optimization by surrogate models in coupled microgrids.* In: at - Automatisierungstechnik, with S. Grundel, K. Worthmann and P. Sauerteig

2018   *Space-Time Galerkin POD with Application in Optimal Control of Semilinear Partial Differential Equations.* In: SIAM J. Sci. Comp., with J. Heiland and P. Benner

2018   *An efficient two-level preconditioner for multi-frequency wave propagation problems.* In: Appl. Numer. Math., with M.B. van Gijzen

2017   *An MSSS-preconditioned matrix equation approach for the time-harmonic elastic wave equation at multiple frequencies.* In: Comput. Geosci., with R. Astudillo, Y. Qiu, E.Y.M. Ang, M.B. van Gijzen and R.-É. Plessix

2015   *Nested Krylov methods for shifted linear systems.* In: SIAM J. Sci Comp., with M.B. van Gijzen

Selection of talks at international conferences

2021   3rd MR Fingerprinting Workshop & Hackathon, Hamburg

2019   Data-Driven Analytics and Optimization for Energy Systems, Copenhagen

2019   SIAM Conference on Computational Science and Engineering, Spokane
Organizer: Mathematical Methods for Control and Optimization of Large-Scale Energy Networks

2017   International Conference on Computational Science, Zurich

2016   SIAM Annual Meeting of Applied Mathematics, Boston

2015   SIAM Conference on Applied Linear Algebra, Atlanta

Awards and scholarships

2017   SIAM Certificate of Recognition

2014   Poster award at the Woudschoten Conference on Scientific Computing (2nd place)

2011–2013   Erasmus Mundus study scholarship

2011   Best Bachelor thesis in Mathematics at TU Berlin (1st place)

2007–2011   Study scholarship of the Friedrich Ebert Foundation

Programming skills

Expert	Scientific Python · C/C++ · continuous integration (svn/git)
Advanced	MATLAB/Simulink · parallel programming with MPI and CUDA
Intermediate	Scrum (agile software development) · MS Visual Studio · PyTorch

Communication skills

2021–2022	Supervision of a research intern at Philips Research Europe: D. Heesterbeek, *Mathematical Optimization of MR Fingerprinting Sequences.*
2021	Organization of the 3rd MR Fingerprinting workshop hosted at Philips Research.
2018–2019	Supervision of Master thesis at Otto von Guericke University Magdeburg: F. Weiss, *Simulation, Analysis and Model-Order Reduction for Dynamic Power Flow Models.*
2017	Data science hackathon *Hack the wind 2017* in Amsterdam.
2015–2017	Teaching assistance in multiple courses on numerical analysis for Bachelor and Master students at TU Delft.
2014–2017	Organization of bi-monthly seminars *Numerical Mathematics in Practice* for PhD students at TU Delft.
2014–2017	Inaugural president of the SIAM Student Chapter at TU Delft.
2008–2009	Speaker of student group *development politics* of the Friedrich Ebert Foundation.

Languages

German	**Mother tongue**	
English	**Business fluent**	*Years of experience in an English-speaking work environment.*
French · Dutch	**Fluent**	*I lived and studied abroad.*

Interests

race cycling · outdoor activities · skiing instructor · traveling

Hamburg, March 11, 2022