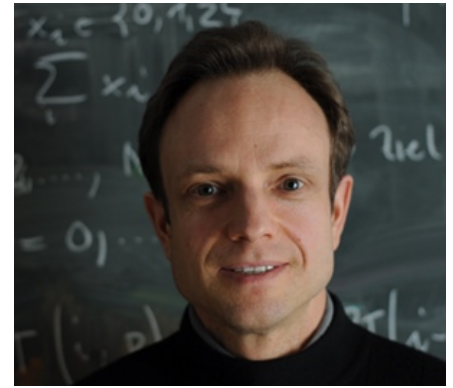


Prof. Dr. Ralf Hiptmair



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Education and Degrees

- 06/86 : Abitur at Schyren-Gymnasium Pfaffenhofen a.d. Ilm, Grade 1.0 (A)
- 10/86-10/87 : Military service in the German federal armed forces
- 11/87-10/92 : Study of mathematics (diploma) with secondary subject electrical engineering at Munich Institute of Technology (TUM)
- 11/92 : Diploma in mathematics (summa cum laude). Diploma thesis on “Mixed finite element discretization of continuity equations in semiconductor device simulation”
- 06/96 : PhD (Dr. rer. nat.) awarded from Department of Mathematics, University of Augsburg, grade “summa cum laude”. Thesis on “Multilevel Preconditioning for Mixed Finite Elements in Three Dimensions”, under the supervision of Prof. Dr. R.H.W. Hoppe
- 11/02 : Habilitation in Mathematics at Mathematisches Insitut, Universität Tübingen. Habilitation thesis on “Numerical Methods for Computational Electromagnetism”

Employment

- 12/92-05/95 : Employed as research scientist with the Bavarian Consortium for High Performance Scientific Computing (FORTWIHR) in the project “Numerical simulation of semiconductors and circuits”
- 06/95-07/96 : Employed as research scientist at the Chair for Applied Mathematics (Prof. Dr. R.H.W. Hoppe) at the University of Augsburg
- 08/96-08/98 : Assistant professor at the University of Augsburg
- 06/97-08/98 : Member of Sonderforschungsbereich 438 on “Mathematical modelling, simulation and verification in materials science and smart systems” at the University of Augsburg and the Munich Institute of Technology (TUM)
- 08/98-03/02 : Head of a team of young researchers (Nachwuchsgruppe) in Sonderforschungsbereich 382 “Computational physics” at the University of Tübingen.
- 04/02-09/02 : Associate professor (C3) at Institute of Applied Mathematics (IAM), University of Bonn, Germany
- 10/02–09/05 : Associate Professor of Applied Mathematics at Seminar für Angewandte Mathematik, ETH Zürich, Switzerland
- since 10/05 : Full Professor of Applied Mathematics at Seminar für Angewandte Mathematik, ETH Zürich, Switzerland
- 08/07-01/08 : Visiting Professor at the Department of Mathematics, The Chinese University of Hong Kong

Special Responsibilities

- 09/09-08/13 : Member of Research Commission of ETH Zurich
since 05/08 : Director of Studies for BSc/MSc CSE programmes of ETH Zurich
09/13-08/15 : Head of Seminar of Applied Mathematics of ETH Zurich

Research Grants and Contracts

- 08/98-03/02 : Grant of Deutsche Forschungsgemeinschaft (DFG) for team of young researchers (Nachwuchsgruppe) in Sonderforschungsbereich 382 “Computational physics” at the of Tübingen. Subject of research: “Discrete differential forms and computation of electromagnetic fields”.
- 10/00-09/02 : Grant by DFG for a joint project with DaimlerChrysler Corp. on “Numerical simulation of inductive heating in car manufacturing” (Transferbereich 26 at the University of Tübingen)
- 01/01-09/03 : DFG grant for project C12 “Direct simulation of optical properties of liquid crystals” in SFB 382 (jointly with Prof. Dr. H. Trebin, ITAP, University of Stuttgart)
- 08/03-07/06 : ETH grant for three year project on “High Resolution Numerical Simulation of Electromagnetic Fields in Thin Conducting Sheets”
- 04/04-03/07 : SNF grant for three year project on “Stable Boundary Element Galerkin Schemes for Direct Acoustic and Electromagnetic Scattering”,
- 04/08-03/11 : SNF grant 200021-119976/1 for three year project on “Spectral Galerkin Boundary Integral Equation Methods for Plasmonic Nano-Structures” (jointly with Prof. C. Hafner, IFH, ETH Zürich), CHF 139700
- 10/08-09/11 : SNF grant 200021-121892/1 for three year project on “Sparse Tensor Approximation Methods for High-Dimensional Transport Problems” (jointly with Prof. C. Schwab, SAM, ETH Zürich), CHF 279450
- 09/09-08/12 : SNF grant for SNF funded ProDoc training module PDAMP 2-122883/1 “Efficient Numerical Methods for Partial Differential Equations” (co-proposer together with M. Grote, D. Kressner, S. Sauter, C. Schwab), CHF 279450
- 09/08-08/11 : Grant from Thales SA for project “Preconditioned Boundary Element Methods for Electromagnetic Scattering at Dielectric Objects”, CHF 318000
- 09/09-08/12 : SNF grant PDFMP2-124883/1 for three year project on “Plane wave discontinuous Galerkin methods” (ProDoc research module, CHF 147713)
- 04/12–03/15 : SNF grant 200021_137873/1 for three year project on “Well-conditioned Boundary Integral Formulations for Scattering”, CHF 157482
- 03/12-02/15 : ETH CHIRP1 CH1-02 11-1 “Computational Nano-Optics: Shape Calculus and Inverse Problems”, CHF 447000 (jointly with J.-L. Bona, Ch. Hafner, J. Löffler, Ch. Schwab)
- 04/12-03/15 : SNF grant 200021_137873/1 “Well-conditioned Boundary Integral Formulations for Scattering”, CHF 157482
- 05/13-04/16 : KTI/ABB-Grant 15183.1 PFIW-IW of the Swiss Federal Commission for Technology and Innovation (CTI) for project “Highly resolved simulations of power devices”, CHF 339’264 (jointly with Dr. Jörg Ostrowski, ABB Corporate Research Baden-Dättwil)
- 04/13-03/16 : SNF grant 200021_146355/1 for three year project on “Computational Magnetohydrodynamics with Discrete Differential Forms”, CHF 157000 (jointly with S. Mishra)
- 09/13-08/16 : SNF grant 200020_146356/1 for three year project on “Sparse Discretization of Kinetic Transport Problems on High-Dimensional Phase Spaces”, CHF 311315 (jointly with P. Grohs and Ch. Schwab)

- 07/13-06/16 : Industrial contract with Robert Bosch AG on project “Edyson 2020: Development of an efficient C++ simulation code for computing electromagnetic fields based on FEM-BEM coupling”, CHF 363000,- (jointly with Dr. Lars Kielhorn)
- 07/13-06/16 : Industrial contract with ABB Switzerland for project on “Highly resolved simulation of power devices”, ABB funding CHF 281313,-, CTI funding CHF 339264,-.
- 04/14-03/17 : ETHIRA grant ETH-04 13-2 “Scattering at complex screens”, CHF 165400,—.
- 09/16-08/19 : SNF Grant 2000021_165674/1 for project on “Coupling of Finite Elements and Multiple Multipoles for Computational Electromagnetism”, CHF 166007,—.

PhD Supervision

- 09/98-06/02 : **Vasile Gradinaru** (Whitney Elements on Sparse Grids)
- 10/00-10/03 : **Jörg Ostrowski** (Boundary Element Methods for Inductive Hardening)
- 01/99-03/03 : **Tanja Bubeck** (The Finite Mass Method with Fields)
- 01/03-08/07 : **Patrick Meury** (Stabel Finite-Element Boundary-Element Galerkin Schemes for Acoustic and Electromagnetic Scattering)
- 01/03-07/08 : **Kersten Schmidt** (High-Order Numerical Modeling of Highly Conductive Thin Sheets)
- 01/04-10/09 : **Benedikt Zeller** (The Spherically Symmetric Einstein-Dirac System)
- 10/04-09/09 : **Gisela Widmer** (Sparse Finite Elements for Radiative Transfer)
- 09/06-03/11 : **Holger Heumann** (Eulerian and Semi-Lagrangian Methods for Advection-Diffusion of Differential Forms)
- 10/08-08/11 : **Andrea Moiola** (Trefftz Discontinuous-Galerkin Method for Time-Harmonic Wave Propagation Problems)
- 06/08-12/12 : **Evelyne Knapp** (Numerical Methods for Comprehensive Characterization of Charge Transport in Organic Light-Emitting Devices)
- 10/09-11/13 : **Eivind Fonn** (Sparse-Tensor Approximation Methods for High-Dimensional Transport Problems)
- 07/11-11/15 : **Sahar Sargheini** (Shape Calculus in Nano-Optics)
- 03/11-12/15 : **Alberto Paganini** (Numerical Shape Optimization with Finite Elements)
- 03/12-05/16 : **Laura Scarabosio** (Shape Uncertainty Quantification for Scattering Transmission Problems)
- 04/12-05/16 : **Elke Spindler** (Second-Kind Single-Trace Boundary Integral Formulations for Scattering at Composite Objects)
- 09/12-09/16 : **Cecilia Pagliantini** (Computational Magnetohydrodynamics with Discrete Differential Forms)
- 12/13-12/16 : **Raffael Casagrande** (Discontinuous Finite Element Methods for Eddy Current Simulation)
- 03/12-04/16 : **Pegah Sourzangar** (Efficient Numerical Modeling of SNOM problems in nano-optics for near-field simulations)
- 11/13-03/18 : **Simon Pintarelli** (Deterministic Numerical Methods for the Boltzmann Equation)
- 01/14-05/18 : **Carolina Urzúa-Torres** (Operator Preconditioning for Galerkin Boundary Element Methods)
- since 09/16 : **Daniele Casati**
- since 05/14 : **Roman Fuchs**
- since 08/17 : **Taha Koltukluoglu**
- since 06/18 : **Andreas Schiller**
- since 09/18 : **Erick Schulz**

Teaching

Selection of courses at ETH Zurich: “Numerical Methods for Elliptic and Parabolic Differential Equations”, “Numerical Methods for Parabolic Differential Equations”, “Numerical Methods for CSE”, “Numerical Method for PDEs”, “Inverse Problems”, “Computational Electromagnetism”, “Numerische Mathematik II”, “Lineare Algebra und Numerische Mathematik”

Membership in (Editorial) Boards and Panels

2007-2017 : Associate editor Journal of Computational Mathematics (JCM)
since 2008 : Editor Zeitschrift für Angewandte Mathematik und Physik (ZAMP)
since 2008 : Associate editor BIT – Numerical Mathematics
since 2011 : Associate editor Numerische Mathematik
since 2013 : Associate editor IMA Journal of Numerical Analysis
since 08/12 : International expert panel of “Elitenetzwerk Bayern” (Bavarian Foundation for Elite Education)
since 2018 : Associate editor Mathematics of Computation
since 2018 : ERC Consolidator Grant Panel: Mathematics (European Research Council)

Organization of Conferences and Workshops

Feb 22-28, 2004 : Workshop on Computational Electromagnetism, MFO Oberwolfach
Feb 4-10, 2007 : Workshop on Computational Electromagnetics and Acoustics, MFO Oberwolfach
Feb 14-20, 2010 : Workshop on Computational Electromagnetics and Acoustics, MFO Oberwolfach
Jul 5-7, 2010 : Workshop on Advance Computational Electromagnetics (ACE), ETH Zurich
Sep 11-14, 2012 : Conference on Scientific Computing in Electrical Engineering (SCEE), ETH Zurich
Jan 20-26, 2013 : Workshop on Computational Electromagnetics and Acoustics, MFO Oberwolfach

Scholarships and Prizes

11/87-03/92 : Scholarship of the Bavarian State for particularly talented students.
02/90-12/92 : Member of the German Scholarship Foundation
07/00 : SIAM Outstanding Paper Prize for the paper “Multigrid Methods for Maxwell’s equations”

Major Scientific Achievements

- Pioneering research in multigrid methods, multilevel and auxiliary space preconditioners for discrete variational problems in $\mathbf{H}(\mathbf{curl}, \Omega)$, and $\mathbf{H}(\mathbf{div}, \Omega)$. Discovery of discrete regular decompositions as a key tool. These algorithms are widely used in commercial and academic EM field solvers, one of them was labeled a “Breakthrough” in the 2008 Report of the Panel on Recent Significant Advancements in Computational Science. (jointly with J. Xu)
- Seminal paper “Canonical construction of finite elements” on the construction of discrete differential form of higher degree, further developed by D. Arnold, R. Falk, and R. Winther as Finite Element Exterior Calculus (FEEC). Complemented by seminal work on “discrete Hodge operators” and research on “Discrete Lie derivatives”, with applications in magneto-hydrodynamics. (jointly with H. Heumann and C. Pagliantini)
- First results on the stability of conforming boundary element methods for integral equations arising from (quasistatic) Maxwell’s equations and the coupling of boundary elements and finite elements, extension to hp -BEM. (jointly with A. Bespalov, A. Buffa, N. Heuer, P. Meury, J. Ostrowski, C. Schwab)
- Comprehensive analysis of Trefftz Discontinuous Galerkin methods for wave propagation (jointly with A. Moiola and I. Perugia).
- Established foundations of operation preconditioning and used it to develop new optimal dual-mesh preconditioners for screen problems (jointly with C. Jerez-Hanckes and C. Urzua)
- Invention of local and global multi-trace boundary elements methods for transmission problems (jointly with X. Claeys and C. Jerez-Hanckes)
- Construction of new second-kind boundary element methods for multi-domain transmission problems (jointly with X. Claeys and E. Spindler)
- Marriage of shape calculus and exterior calculus and new error analysis for the discretization of PDE-constrained shape gradients (jointly with J. Li, A. Paganini and S. Sargheini).