

Peter Benner – Curriculum Vitae
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Date and place of birth: May 25, 1967 in Kirchen/Sieg (Germany)

Nationality: German

**Education:**

1973 – 1977 Grundschule Betzdorf
 1977 – 1986 Staatliches Freiherr-vom-Stein Gymnasium in Betzdorf
 06/1986: Abitur

Military service:

10/1986 – 12/1987 in Rennerod/Ww., 3. *Sanitätsbataillon V* (batallion for medical service)

Higher education:

10/1987 – 03/1993 student of mathematics (major) and economics (minor)
 at RWTH Aachen. 05/1990: Vordiplom, 03/1993: Diplom.

08/1993 – 12/1993 Ph.D. student at the University of Kansas, Lawrence, USA

01/1994 – 12/1996 Ph.D. student at the Technical University of Chemnitz-Zwickau,
 02/1997 Ph.D. in mathematics, Technical University of Chemnitz-Zwickau
 05/2001 *Habilitation* colloquium, University of Bremen

Experience:

10/1989 – 08/1992 *studentische Hilfskraft* and
 03/1993 – 07/1993 *wissenschaftliche Hilfskraft* (graduate teaching assistant)
 at the *Institut für Geometrie und Praktische Mathematik*
 of the RWTH Aachen

02/1991 – 06/1992 software engineer for *Ingenieurbüro Hille*, Aachen

08/1993 – 12/1993 graduate teaching assistant at the University of Kansas
 in Lawrence, USA

12/1994 – 12/1996 *Wissenschaftlicher Mitarbeiter* (research assistant) at the
 Department of Mathematics,
 Technical University of Chemnitz-Zwickau

01/1997 – 08/1997 *Wissenschaftlicher Mitarbeiter* and
 09/1997 – 09/2001 *Wissenschaftlicher Assistent* (assistant professor)
 at the *Zentrum für Technomathematik* of the University of Bremen

- 09/2001 – 09/2003 *Oberassistent* (lecturer) at the Institute for Mathematics,
Technische Universität Berlin (on leave 10/2001 – 03/2002)
- 10/2001 – 03/2002 Visiting Associate Professor, Technische Universität Hamburg-Harburg
since 10/2003 Full Professor for Mathematics in Industry and Technology,
Chemnitz University of Technology
- 05/2009 Call W3-Professorship “Applied Mathematics in Engineering”
(*Angewandte Mathematik in den Ingenieurwissenschaften*),
Technische Universität Hamburg-Harburg.

Editorial work

- Associate editor of SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS since 2005.
- Member of the editorial board of NUMERICAL LINEAR ALGEBRA WITH APPLICATIONS since 2008.
- Member of the editorial board of COMPUTING LETTERS since 2004.
- Member of the editorial board of the SIAM book series FUNDAMENTALS OF ALGORITHMS 2003–2008.
- *Dimension Reduction of Large-Scale Systems* (with V. Mehrmann and D.C. Sorensen), LECTURE NOTES IN COMPUTATIONAL SCIENCE AND ENGINEERING, Vol. 45, Springer-Verlag, Berlin/Heidelberg, June 2005, xii+395 p., ISBN: 3-540-24545-6.
- *Model Reduction for Circuit Simulation* (with M. Hinze and J. ter Maten), LECTURE NOTES IN ELECTRICAL ENGINEERING, Springer-Verlag, Berlin/Heidelberg, planned publication date: December 31, 2009.
- Special issue on *Order Reduction of Large-Scale Systems* (with R.W. Freund, D.C. Sorensen, and A. Varga), LINEAR ALGEBRA AND ITS APPLICATIONS, Vol. 415, Issues 2-3, pages 231–578, 2006.
- Special issue on *Large-Scale Matrix Equations of Special Type*, NUMERICAL LINEAR ALGEBRA WITH APPLICATIONS, 2008, Vol. 15, No. 9, pp. 747–886.

Articles and technical reports

A complete list of the more than 160 published articles in journals and proceedings, book chapters and technical reports can be found at

<http://www.tu-chemnitz.de/~benner/publications.php>.

Software

I am co-author of several software packages, including SLICOT (Subroutine Library In Control Theory), HAPACK (HAmiltonian eigensolver PACKage), PLiC/PLiCMR (Parallel Library in Control/Model Reduction), ...

A complete list can be found at

<http://www.tu-chemnitz.de/~benner/software.php>.

Talks at conferences

Selected talks since 2001 can be found at

<http://www.tu-chemnitz.de/~benner/talks.php>,

including, in particular, invited and plenary talks at workshops and conferences.

Invited lectures at universities and research institutes

May 1996	University of Kansas, Lawrence (USA)
November 1996	Universidad Politécnica de Valencia, Valencia (Spain)
February 1998	University of Würzburg (Germany)
May 1998	Rice University, Houston (USA)
June 1999	University of Calgary (Canada)
August 1999	University of Kansas, Lawrence (USA)
January 2000	Technical University of Munich (Germany)
February 2000	Università degli Studi di Modena e Reggio Emilia, Modena (Italy)
July 2000	Technical University of Dresden (Germany)
July 2001	Technical University of Braunschweig (Germany)
July 2001	Lawrence Berkeley National Laboratory, Berkeley (USA)
November 2001	Technical University of Hamburg-Harburg (Germany)
Dezember 2001	Aachen University of Technology (RWTH Aachen, Germany)
January 2002	Technical University of Berlin (Germany)
February 2002	Chemnitz University of Technology (Germany)
July 2002	University of Rostock (Germany)
September 2002	University of Freiburg/Institute for Microsystems Technology (Germany)
January 2003	University of Leipzig (Germany)
January 2004	Chemnitz University of Technology/Institute for Physics (Germany)
February 2004	Technical University of Hamburg-Harburg (Germany)
October 2004	University of Hagen (Germany)
Juni 2005	Infineon Technologies, Munich (Germany)
March 2006	Courant Institute of Mathematical Sciences, New York (USA)
June 2006	Technical University of Dresden (Germany)
November 2006	Universidad Jaime I de Castellón (Spanien)
November 2006	Technical University of Ilmenau (Germany)
December 2006	RWTH Aachen (Germany)
March 2007	J.J. Strossmeyer University, Osijek (Croatia)
October 2007	University of Oxford (GB)
October 2007	MIT, Cambridge (USA)
November 2007	Virginia Tech, Blacksburg (USA)
November 2007	University of Kansas, Lawrence (USA)
January 2008	Universität Bielefeld (Germany)
April 2008	Université Paul Sabatier, Toulouse (France)
November 2008	Universidad Carlos III de Madrid (Spain)
November 2008	Chemnitz University of Technology (Germany) – Dies Academicus
December 2008	Technical University of Hamburg-Harburg (Germany)
March 2009	Rice University, Houston (USA)
June 2009	University of Trier (Germany)

Research visits

June/July 1994	(5 weeks)	University of Kansas, Lawrence (USA)
February 1995	(1 week)	Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen (Germany)
July 1995	(1 week)	University of Reading (GB)
February 1996	(1 week)	University of Reading (GB)
April/May 1996	(5 weeks)	University of Kansas, Lawrence (USA)
May/June 1996	(3 weeks)	University of California at Santa Barbara (USA)
November 1996	(1 week)	Universidad Politécnica de Valencia (Spain)
February 1998	(1 week)	Chemnitz University of Technology (Germany)
March 1998	(1 week)	Universidad Politécnica de Valencia (Spain)
May 1998	(1 week)	Rice University, Houston (USA)
May/June 1998	(1 week)	Northern Illinois University, DeKalb (USA)
December 1998	(1 week)	Universidad Politécnica de Valencia, Valencia (Spain)
March 1999	(1 week)	Universidad Jaime I de Castellón (Spain)
March 1999	(1 week)	Universidad Politécnica de Valencia (Spain)
June 1999	(1 week)	University of Calgary (Canada)
August 1999	(4 weeks)	University of Kansas, Lawrence (USA)
October 1999	(1 week)	Universidad Jaime I de Castellón (Spain)
January 2000	(2 weeks)	Chemnitz University of Technology (Germany)
February 2000	(2 weeks)	Università degli Studi di Modena e Reggio Emilia, Modena (Italy)
May 2000	(1 week)	Technical University of Munich (Germany)
July 2000	(1 week)	Chemnitz University of Technology (Germany)
October 2000	(1 week)	University of Kansas, Lawrence (USA)
November 2000	(1 week)	Universidad Jaime I de Castellón (Spain)
March–April 2001	(2 weeks)	University of Kansas, Lawrence (USA)
July 2001	(1 week)	Lawrence Berkeley National Laboratory, Berkeley (USA)
July 2001	(2 weeks)	University of Kansas, Lawrence (USA)
August 2002	(1 week)	Technical University of Munich (Germany)
September 2004	(1 week)	Universidad Jaime I de Castellón (Spain)
February–March 2006	(3 weeks)	Courant Institute of Mathematical Sciences, New York University (USA)
November 2006	(1 week)	Universidad Jaime I de Castellón (Spain)
March 2007	(1 weeks)	Department of Mathematics, J.J. Strossmeyer University, Osijek (Croatia)
August 2007	(2 weeks)	Escuela Politécnica Nacional, Quito (Ecuador)
October 2007	(1 week)	University of Oxford (GB)
October–November 2007	(4 weeks)	MIT/Virginia Tech/University of Kansas (USA)
April–May 2008	(1 week)	Université Paul Sabatier, Toulouse (France)
November 2008	(1 week)	Universidad Jaime I de Castellón (Spain)
February 2009	(1 week)	Virginia Tech, Blacksburg (USA)
March 2009	(1 week)	Rice University, Houston (USA)

Supervised Ph.D. theses

- Ulric Kintzel, *Polar Decompositions and Procrustes Problems in Finite Dimensional Indefinite Scalar Product Spaces*, April 2005, TU Berlin.
- Viatcheslav Sokolov, *Contributions to the Minimal Realization Problem for Descriptor Systems*, June 2006, TU Chemnitz.
- Hermann Mena, *Numerical Solution of Differential Riccati Equations Arising in Optimal Control Problems for Parabolic Partial Differential Equations*, August 2007, EPN Quito (Ecuador).
- Ulrike Baur, *Control-Oriented Model Reduction for Parabolic Systems*, January 2008, TU Berlin.

Supervision of ongoing Ph.D. theses

- Jens Saak, *Control Design for Semilinear Parabolic Control Problems*.
- Sabine Görner, *Model Predictive Control for Nonlinear Convection-Diffusion Equations*.
- Mohammad Sahadet Hossain, *Model Reduction for Time-Varying Descriptor Systems*.
- Philip Losse, *Numerical Methods for Robust Control of Descriptor Systems*.
- Thomas Mach, *Numerical Algorithms for Eigenvalue Probleme of Hierarchical Matrices*.
- André Schneider, *Model Reduction for Linear Systems with Massive I/O Ports*.

Review of Ph.D. theses

- Tatjana Stykel, *Analysis and Numerical Solution of Generalized Descriptor Systems*, June 2002, TU Berlin.
- Ravindra Boojhawon, *Deflated Algorithms for Non-Symmetric Linear Systems*, July 2005, University of Mauritius.
- Frank Blömeling, *Mult-level Substructuring Methods for Model Order Reduction*, January 2008, TU Hamburg-Harburg.

Review of Habilitation theses

- Ludwig Kohaupt, *Contributions to the Determination of Optimal Bounds on the Solution of Ordinary Differential Equations with Vibration Behavior*, April 2009, TU Bergakademie Freiberg.
- Tatjana Stykel, *cumulative*, May 2009, TU Berlin.

Supervision of Diploma/Master theses

- Jens Saak, *Effiziente numerische Lösung eines Optimalsteuerungsproblems für die Abkühlung von Stahlprofilen (Efficient Numerical Solution of an Optimal Control Problem for the Efficient Cooling of Steel Profiles)*, September 2003, University of Bremen.
- Heidi Knüpfer, *Berechnung von Torsionsschwingungen für Zahnsteuertriebe in Verbrennungsmotoren (Computation of Torsional Vibrations for Drive Belts in Combustion Engines)*, December 2004, TU Chemnitz. (joint supervision with Dr. Gerd Kunert, IAV GmbH, Chemnitz.)
- Christoph Marahrens, *Numerische Methoden zur Produkt-Singulärwertzerlegung (Numerical Methods for the Product SVD)*, May 2005, TU Berlin.
- Martin Stoll, *Locking and Purging beim Hamiltonischen Lanczos-Prozess (Locking and Purging for the Hamiltonian Lanczos Process)*, September 2005, TU Chemnitz.
- Saif Ullah, *Robust Control of a Stewart Platform System*, January 2006, TU Chemnitz.

- Tobias Rothaug, *Stabilisierung inkompressibler Strömungen durch Dirichlet-Randsteuerung (Stabilization of Incompressible Flows by Dirichlet Boundary Control)*, September 2007, TU Chemnitz.
- Martin Purrucker, *Simulation of Focused Electron Beam Induced Deposition*, together with EMPA Materials Science & Technology, Thun (Switzerland); March 2008.
- Susan Dürigen, *Modeling and Optimal Control of Chemical Mechanical Planarization at Integrated Circuit Fabrication*, together with AMD, Dresden; March 2008.
- André Schneider, *Model reduction for linear systems with a large number of terminals*, together with Qimonda, Neubiberg; April 2008.
- Thomas Mach, *Lösung von Randintegralgleichungen zur Bestimmung der Kapazitätsmatrix von Elektrodenanordnungen mittels \mathcal{H} -Arithmetik (Solving Boundary Integral Equations for the Determination of the Capacity Matrix for Electrode Arrangement using \mathcal{H} -Arithmetic)*; May 2008.
- René Günzel, *Balanced truncation for descriptor systems arising in interconnect modeling*, together with Qimonda, Neubiberg; August 2008.

Supervision of ongoing Diploma/Master theses

- Cedric Effenberger, *Rational Krylov Subspace Methods for Hamiltonian Eigenproblems*.
- Matthias Voigt, *H_∞ -Norm Computation for Descriptor Systems*.

Supervision of Bachelor Theses

- Patrick Kürschner, *Das Jacobi-Davidson-Verfahren auf Parallelrechnern (The Jacobi-Davidon Method on Parallel Computers)*; March 2008.

Funded Projects

As responsible partner:

- Title:* System Reduction for IC Design in Nano-Electronics.
Funded by: BMBF (German Federal Ministry of Education and Research, program *Mathematics for Innovation in Industry and Services*).
Partners: TU Berlin/MATHEON, TU Braunschweig/Institute *Computational Mathematics*, University of Hamburg/Department Mathematics, Fraunhofer-ITWM Kaiserslautern, NEC Europe Ltd. Sankt Augustin, Qimonda AG Neubiberg, Infineon Technologies AG Neubiberg.
Term: 07/2007 – 12/2010.
Note: Network coordinator.
- Title:* Operational Model Order Reduction for Nanoscale IC Electronics.
Funded by: EU (Marie Curie Host Fellowships for the Transfer of Knowledge (ToK) Industry-Academia Partnership Scheme).
Partner: NXP/Philips Eindhoven, TU Eindhoven, Universiteit Antwerpen.
Term: 02/2007 – 01/2010.
- Title:* Integrated Simulation of the System "Machine Tool - Actuation - Stock Removal Process" based on Model Order Reduction of the Structural FEM Model.
Funded by: *Deutsche Forschungsgemeinschaft* (German Research Foundation).
Partners: Technical University of Munich/Institute for Machine Tools and Industrial Management (iwb), TU Braunschweig/Institute *Computational Mathematics*.
Term: 01/2008 – 06/2009.
- Title:* Optimal Control-Based Feedback Stabilization for Multi-Field Flow Problems.
Funded by: *Deutsche Forschungsgemeinschaft* (German Research Foundation), Special Priority Program 1253 *Optimization with Partial Differential Equations*.
Partner: Friedrich-Alexander-Universität Erlangen-Nürnberg/Institute for Applied Mathematics (Prof. Dr. E. Bänsch).
Term: 10/2006 – 09/2009, Verlängerung bis 06/2012.
- Title:* Numerical algorithms for generalized eigenvalue problems of even structure with application in robust control of descriptor systems.
Funded by: *Deutsche Forschungsgemeinschaft* (German Research Foundation).
Partner: TU Berlin/Institute for Mathematics (Prof. Dr. V. Mehrmann).
Term: 09/2006 – 11/2009.
- Title:* Automatic, Parameter-Preserving Model Reduction for Applications in Microsystems Technology.
Funded by: *Deutsche Forschungsgemeinschaft* (German Research Foundation).
Partner: University of Freiburg/Institute for Microsystems Technology (Prof. Dr. J. Korvink).
Term: 1/2008 – 12/2009.

7. *Title:* Numerical Solution of Optimal Control Problems with Instationary Diffusion-Convection and Diffusion-Reaction Equations.
Funded by: Deutsche Forschungsgemeinschaft (German Research Foundation).
Term: 01/2006 – 2/2009.
8. *Title:* Using Hamiltonian Structure in System Norm Computations.
Funded by: Deutsche Forschungsgemeinschaft (German Research Foundation).
Term: 07/2008 (research visit of Dr. Sima (Bucarest) in Chemnitz).
9. *Title:* Modeling and optimal control for chemical-mechanical planarization.
Funded by and Partner: AMD Saxony LLC & Co. KG, Dresden.
Term: 12/2006 – 01/2008.
10. *Title:* Parallel Algorithms for Large-Scale Sparse Algebraic Riccati Equations and Applications in Control .
Funded by: DAAD (German Academic Exchange Service), program Acciones Integradas Hispano-Alemanas.
Partner: Universidad Jaime I de Castellón (Prof. Dr. E. Quintana-Ortí).
Term: 01/2006 – 12/2007.
11. *Title:* Matrix Equation Solvers Based on the Matrix Sign Function.
Funded by: Deutsche Forschungsgemeinschaft (German Research Foundation).
Term: 07/2007 (research visit of Dr. Sima (Bucarest) in Chemnitz).
12. *Title:* Virtual Input-Output-Models for Dimension Reduction of the Simulation of Powergrid Models.
Funded by and Partner: Infineon Technologies AG/Qimonda AG, München.
Term: 04/2006 – 09/2006.
13. *Title:* Numerical Algorithms for Matrix Equations and Structured Eigenvalue Problems.
Funded by: Deutsche Forschungsgemeinschaft (German Research Foundation).
Term: 11/2005 – 12/2005 (research visit of Dr. Sima (Bucarest) in Chemnitz).
14. *Title:* Parallel numerical solution of optimal control problems with instationary diffusion-convection-reaction equations .
Funded by: Deutsche Forschungsgemeinschaft (German Research Foundation), within Research Unit 393 “Parallel Numerical Simulation for Physics and Continuum Mechanics” at TU Chemnitz.)
Term: 04/2004 – 12/2005.
15. *Title:* Computation of Torsional Vibrations for Drive Belts in Combustion Engines.
Funded by and Partner: Ingenieurgesellschaft Auto und Verkehr (IAV GmbH), Chemnitz.
Term: 04/2004 – 09/2004.
16. *Funded by:* Deutsche Forschungsgemeinschaft (German Research Foundation).
Title: Numerical methods for robust control.
Partners: Universität Bremen, DLR Oberpfaffenhofen, TU Berlin.
Term: 11/2000 – 10/2003.

17. *Funded by:* EU Brite/EURAM Programme (thematic network).
Title: NICONET (Numerics in Control Network) – Network for Development and Evaluation of Numerically Reliable Software in Control Engineering and its Implementation in Production Technologies.
Partners: 10 universities, 2 non-academic research institutes, 5 companies from 7 European countries.
Term: 01/1998 – 06/2002.

As contributor:

1. *Funded by:* EADS/DaimlerChrysler Aerospace AG (DASA) Bremen
Title: Fast solvers for the computation of electromagnetic fields.
Partners: Universität Bremen, EADS Bremen.
Terms: 06/2000 – 11/2000, 01/2001 – 12/2002.
2. *Funded by:* DAAD-Programme Acciones Integradas Hispano-Alemanas.
Title: Parallel algorithms for model reduction of large and sparse control systems.
Partners: Universität Bremen, Universidad Jaime I de Castellón, TU München.
Term: 01/2000 – 12/2001.
3. *Funded by:* DAAD-Programme Acciones Integradas Hispano-Alemanas.
Title: Parallel algorithms for linear-quadratic optimal control problems.
Partners: Universität Bremen, TU Chemnitz, Universidad Politécnica de Valencia, Universidad Jaime I de Castellón.
Term: 01/1998 – 12/1999.
4. *Funded by:* Deutsche Forschungsgemeinschaft (German Science Foundation).
Title: Numerical methods for large and singular control problems.
Partners: Universität Bremen, DLR Oberpfaffenhofen, TU Chemnitz.
Term: 10/1994 – 09/1996, 01/1997 – 12/1998.
5. *Funded by:* DAAD/ARC.
Title: Numerical methods for control and signal processing.
Partners: Universität Bremen, TU Chemnitz-Zwickau, University of Reading.
Term: 10/1994 – 09/1996.

Miscellaneous

Refereeing

- *Deutsche Forschungsgemeinschaft* (German Research Foundation)
- *Volkswagenstiftung* (Volkswagen Foundation)
- Grant Agency of the Academy of Sciences of the Czech Republic
- Technology Foundation STW, The Netherlands
- National Council of Science, Croatia
- MITACS, Canada
- Science Foundation Ireland
- Mathematical Reviews
- SIAM Books
- *Mathematical Journals*: SIAM Review; SIAM Journal on Control and Optimization; SIAM Journal on Scientific Computing; Multiscale Modeling and Simulation; SIAM Journal on Matrix Analysis and Applications; Linear Algebra and its Applications; Electronic Journal of Linear Algebra; Numerical Linear Algebra with Applications; Numerische Mathematik; BIT Numerical Mathematics; Computing; Advances in Computational Mathematics; Applied Numerical Mathematics; Electronic Transactions on Numerical Analysis; Numerical Algorithms; Applied Numerical Analysis & Computational Mathematics; Journal of Computational and Applied Mathematics; Zeitschrift für Angewandte Mathematik und Mechanik; Mathematical and Computer Modelling of Dynamical Systems; Mathematics of Control, Signals, and Systems; Computational Optimization and Applications; Applied Mathematics and Optimization; Journal of Mathematical Analysis and Applications; Rocky Mountain Journal of Mathematics; ANZIAM Journal; Journal of Inequalities and Applications; International Journal of Applied Mathematics and Computer Science; International Journal of Computer Mathematics; Journal of Parallel and Distributed Computing.
- *Engineering Journals*: IEEE Control Systems Magazine; IEEE Transactions on Automatic Control; Systems & Control Letters; Automatica; International Journal of Control; European Journal of Control; International Journal of System Sciences; Circuits, Systems, and Signal Processing; Controle & Automação; International Journal of Modelling and Simulation; Journal of Zhejiang University SCIENCE.
- Miscellaneous Conference Proceedings, in particular regularly IEEE CDC, IEEE CCA/CACSD, American Control Conference.

Membership in Scientific Organisations

- *Deutsche Mathematiker-Vereinigung (DMV)* (German Mathematical Society)
- *Gesellschaft für angewandte Mathematik und Mechanik (GAMM)* (Society for Applied Mathematics and Mechanics).
GAMM Activity Group “Applied and Numerical Linear Algebra” (chair since 01/2009).
GAMM Activity Group “Dynamical Systems and Control Theory”.
GAMM Activity Group “Optimization with Partial Differential Equations”.
- Society for Industrial and Applied Mathematics (SIAM).
SIAM Activity Group on “Linear Algebra”.
SIAM Activity Group on “Computational Science and Engineering”.
- European Mathematical Society (EMS).

- GMA Activity Group 1.30 “Modeling, Identification and Simulation in Automation Technology”.
- NICONET e.V. (society for developing control and systems software, in particular SLICOT¹; chair since 07/2006).

Awards, stipends, etc.

- *Springorum-Denkmünze* of RWTH Aachen for excellent diploma thesis.
- Ph.D. stipend of the state Saxonia, 01–11/1994.
- DAAD-fellowship USA for visiting the University of Kansas in Lawrence, Kansas, and the University of California at Santa Barbara, California, 04–06/1996.

¹See <http://www.slicot.org>.