

WOLFGANG BANGERTH: CURRICULUM VITAE

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Born May 14th, 1973, Ostfildern, Germany
Parents Friedrich Karl Bangerth, Professor at the University of
 Stuttgart-Hohenheim, Germany;
 Ulrike Bangerth, Computer Programmer
Married to Jill Louise Zarestky, June 11th, 2005
Nationality German, United States permanent resident (“greencard”)

Education

1979–1983 Primary School Wolfschlugen
1983–1992 Gymnasium Nürtingen; Abitur with grades “very good”
1992–1993 Military Service in a telecommunications unit
1993–1995 Study of Physics at the University of Stuttgart;
 Vordiplom (Bachelor) with grades “very good – good”
1995–1999 Study of Physics at the University of Heidelberg; Diploma
 thesis on adaptive finite element methods for the wave equa-
 tion; Grades: “very good, with distinction”
1999–2002 Work on a Ph.D. thesis on “Adaptive Finite Element Meth-
 ods for the Identification of Distributed Parameters in Par-
 tial Differential Equations” under the supervision of Prof.
 R. Rannacher (Heidelberg). Member of the Graduiertenkol-
 leg “Modellierung und Wissenschaftliches Rechnen in Math-
 ematik und Naturwissenschaften”;
 Grades: “summa cum laude” (“with distinction”).

Professional Experience

1994–1995 Work with Prof. W. Wendland and Prof. A. Saendig
 (Stuttgart), doing calculations with Mathematica and
 typesetting.
1996 Work with Prof. H.-C. Pauli (Heidelberg), writing a lecture
 script on “Quantum field theory”.
1997 Work with the Robert Bosch AG, doing simulations on fluid
 flow in the automobile motor industry using the FIRE CFD
 code.
1997–2002 Work with Prof. R. Rannacher (Heidelberg), on flow simula-
 tions, implementation of the finite element library deal.II,
 computations on adaptive methods, organization of the
 ENUMATH 97 conference.

- 1998– Principal author and maintainer of the deal.II finite element library (see <http://www.dealii.org>).
- 2001 Exterior Research Fellow with Industrial Research Ltd., Wellington, New Zealand.
- 2002 Assistant at the ETH Zürich, Switzerland, in the group of Prof. C. Schwab.
- 2002–2003 Postdoctoral Research Fellow at the Institute for Computational Engineering and Sciences (ICES), University of Texas at Austin.
- 2003–2005 Postdoctoral Research Fellow with joint position at the Institute for Computational Engineering and Sciences (ICES) and the Institute for Geophysics, University of Texas at Austin.
- 2005 Consultant (Research Scientist) for the Department of Chemistry, Texas A&M University.
- 2006–2007 External Research Fellow, Institute for Geophysics, University of Texas at Austin.
- 2005– Elected member of the Science Steering Committee, Center for Computational Infrastructure in Geodynamics (CIG). Re-elected 2008.
- 2005–2009 Assistant Professor, Department of Mathematics, Texas A&M University.
- 2009– Associate Professor, Department of Mathematics, Texas A&M University.
- 2009– Member, Executive Committee of the Department of Mathematics, Texas A&M University.

Awards

- 1999–2001 Ph.D. fellowship from Graduiertenkolleg “Modellierung und Wissenschaftliches Rechnen in Mathematik und Naturwissenschaften” (Modeling and scientific computing in mathematics and natural sciences), University of Heidelberg, Germany
- 2002–2003 Postdoctoral Research Fellowship from the Institute for Computational Engineering and Sciences (ICES), University of Texas at Austin
- 2003–2005 Palisades Geophysical Institute (PGI) Postdoctoral Fellowship from the Institute for Geophysics, University of Texas at Austin
- 2006 My deal.II finite element library software is accepted into the computing industry standard SPEC CPU2006 benchmark (see www.spec.org); the award is \$5,000

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| 2007 | Recipient (with G. Kanschat and R. Hartmann) of the J. H. Wilkinson Prize for Numerical Software for the deal.II software; the award is \$3,000 |
| 2008 | Alfred P. Sloan Research Fellowship; the award consists of unrestricted research funds to the amount of \$50,000. |

Other Experience

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| Computers | Knowledge of the Unix operating system, profound knowledge of and experience in object oriented programming with C++ and knowledge of several other programming languages.
Maintainer of the deal.II finite element library
Maintainer of the GNU GCC compiler |
| Languages | Fluent in English, knowledge of French and remnants of Japanese; native speaker of German. |
| Memberships | Society for Industrial and Applied Mathematics (SIAM), American Association for the Advancement of Science (AAAS). |

Research Interests

Inverse problems and medical imaging in the optical frequency range;

Numerical finite element software;

Geophysical modeling, optimization with PDE models of reservoirs, simulation of tectonic faulting.

Finite element theory, adaptivity, and a posteriori error estimation;

Teaching experience

Classes taught:

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| 2002 | One semester practical course in Advanced Finite Element Software, ETH Zurich, Switzerland. |
| 2005 | MATH 609: Numerical Methods for Engineers. |
| 2006 | MATH 664: Computational Software for Large-Scale PDE Solvers.
MATH 412: Theory of partial differential equations.
MATH 417: Numerical Analysis. |
| 2007 | MATH 417: Numerical Analysis.
MATH 151: Engineering calculus I.
MATH 412: Theory of partial differential equations.
Informal weekly class on Numerical Algorithms for Inverse Problems (spring). |

Working seminar on Inverse Problems (fall).
Students in my directed studies class (MATH685): 4
(spring), 1 (summer), 1 (fall).
2008 MATH 676: Finite element methods in scientific computing.

Supervision of students:

- 2006 Taejong Kim (Math; member of Ph.D. committee, graduation 2006)
Amit Sahu (Division of Molecular Imaging, Department of Radiology, Baylor College of Medicine, Houston; member of Ph.D. committee, graduation 2006)
- 2007 Ahmed Al-Huthali (Petroleum Engineering; member of Ph.D. committee)
Moritz Allmaras (Mathematics; co-chair of Ph.D. committee)
Yulia Georgieva-Hristova (Mathematics; co-chair of Ph.D. committee)
Delin Wang (Aerospace Engineering; member of Ph.D. committee)
Xing Jin (Biomedical Engineering; member of Ph.D. committee)
- 2008 Ahmed Al-Huthali (Petroleum Engineering; member of Ph.D. committee)
Moritz Allmaras (Mathematics; co-chair of Ph.D. committee)
Yulia Georgieva-Hristova (Mathematics; co-chair of Ph.D. committee)
Delin Wang (Aerospace Engineering; member of Ph.D. committee)
Xing Jin (Biomedical Engineering; member of Ph.D. committee)
Adrienne LaFleur (Nuclear Engineering; member of Ph.D. committee)
Bashar Anabtawi (Computer Science; member of Ph.D. committee)
- 2009 Ahmed Al-Huthali (Petroleum Engineering; member of Ph.D. committee)
Moritz Allmaras (Mathematics; co-chair of Ph.D. committee)
Yulia Georgieva-Hristova (Mathematics; co-chair of Ph.D. committee)
Delin Wang (Aerospace Engineering; member of Ph.D. committee)
Xing Jin (Biomedical Engineering; member of Ph.D. committee)
Adrienne LaFleur (Nuclear Engineering; member of Ph.D. committee)
Bashar Anabtawi (Computer Science; member of Ph.D. committee)
Sunnie Joshi (Mathematics; member of Ph.D. committee)

Mentoring of students:

2006 Gregory Thoreson (Nuclear Engineering, Undergraduate Summer Research Grant in Engineering)

Curriculum development:

Developed the new course “MATH 676: Finite element methods in scientific computing” (taught as MATH 664 in the spring of 2006, and in the fall of 2008).

Community involvement

Reviewing, evaluation, and advisory councils

Elected member of the Science Steering Committee, Center for Computational Infrastructure in Geodynamics (CIG), located at Caltech, 2005–, re-elected 2008.

Member, High Performance Computing Committee, Institute for Applied Mathematics and Computational Science, Texas A&M University; since 2008.

Member, editorial board, SIAM Journal on Scientific Computing (SISC), since 2009.

NSF Panelist for Cyberenabled Discovery and Innovation (CDI) Type II proposals, Arlington, VA, June 5–6, 2008.

NSF Panelist for Inverse Problems proposals, Arlington, VA, April 20, 2009.

Member, evaluation committee for Department of Energy SciDAC Applied Math Mid-Term Reviews, Washington, D.C., April 22, 2009.

Member, Executive Committee of the Department of Mathematics, Texas A&M University, 2009-2010.

Reviewer for Advances in Engineering Software, Applied Numerical Mathematics, Computer Methods in Applied Mechanics and Engineering (CMAME), Communications in Numerical Methods in Engineering, Engineering with Computers, International Journal of Numerical Methods in Engineering (IJNME), Inverse Problems, Journal of Computational Physics (JCP), Journal of Mathematical Analysis and Applications, Journal of Numerical Analysis, Journal of Petroleum Sciences and Engineering, Mathematics of Computation, Medical Physics, Numerical Methods in Partial Differential Equations (NMPDE), Numerische Mathematik, Optics Express, SIAM Journal on Optimization (SICON), SIAM Journal on Numerical Analysis (SINUM), SIAM Journal on Scientific Computing (SISC), ACM Transactions on Mathematics Software (ACM TOMS)

Organization of workshops, minisymposia and conferences

Member of the organizing team of the ENUMATH'97 conference, Heidelberg, Germany, 1997

Co-organizer of a mini-symposium on adaptive methods at the GAMM Jahrestagung (GAMM Annual Conference), Zurich, Switzerland, 2001.

Member of the program committee of a workshop on “Parallel/High-Performance Object-Oriented Scientific Computing (POOSC 05)” at the “European Conference on Object-Oriented Programming (ECOOP 2005)”, Glasgow, UK, 2005.

Member of the program committee of a workshop on “Parallel/High-Performance Object-Oriented Scientific Computing (POOSC 06)” at the “European Conference on Object-Oriented Programming (ECOOP 2006)”, Tours, France, 2006.

Organizer of a “Workshop on Computational Science Issues in Geodynamics Applications”, Austin, TX, October 16-17, 2006.

Organizer of a minisymposium “High-level software for the numerical solution of partial differential equations” at ICIAM 2007, Zurich, Switzerland, July 16-20, 2007.

Organizer and main speaker (19 hours) of a “Workshop on Adaptive Mesh Refinement Techniques in Geodynamics Applications”, Boulder, CO, October 24-27, 2007.

Member of the program committee of a workshop on “Parallel/High-Performance Object-Oriented Scientific Computing (POOSC 08)” at the “European Conference on Object-Oriented Programming (ECOOP 2008)”, Paphos, Cyprus, 2008.

Organizer of the workshop “Mathematical and Computational Issues in the Solid Earth Geosciences”, Santa Fe, NM, September 15–17, 2008.

Organizer of the “CBMS Conference on Adaptive Finite Element Methods for Partial Differential Equations”, College Station, TX, May 18–22, 2009.

Other service activities

Elected member of the Texas A&M University Faculty Senate, 2006–2009.

Member of the nominating committee for candidates to the Science Steering Committee and Executive Committee of the Center for Computational Infrastructure in Geodynamics, 2006.

Co-author of the report “The Path to Peta-scale Computing in Geodynamics. A report by the Science Steering Committee, Computational Infrastructure for Geodynamics (CIG)” to the National Science Foundation, November 2006.

Chair of the nominating committee for candidates to the Science Steering Committee and Executive Committee of the Center for Computational Infrastructure in Geodynamics, 2009.

Elected member of the Texas A&M University Council of Principal Investigators, 2009–

Member, Institute for Applied Mathematics and Computational Sciences (IAMCS), Institute for Scientific Computation (ISC), Center for Large Scale Scientific Computing (CLASS), all at Texas A&M University.

Presentations at conferences

Invited presentations are marked with an asterisk *. Co-organization of the respective event/mini-symposium is marked by a plus +.

- 1999 * International Conference on Theoretical and Computational Acoustics, Trieste, Italy
 European Conference on Numerical Mathematics and Applications, Jyvaeskylae, Finland
- 2000 GAMM Workshop on Numerical Mathematics, Kiel, Germany
 Waves 2000, Santiago de Compostela, Spain
 Numerical Modelling in Continuum Mechanics, Prague, Czech Republic
- * 16th IMACS World Congress, Lausanne, Switzerland
- 2001 *+ GAMM Jahrestagung (GAMM Annual Conference), Zurich, Switzerland
- 2002 * International Conference on Multifield Problems, Stuttgart, Germany
- * World Congress on Computational Mathematics, Vienna, Austria
- 2003 Finite Element Rodeo, Houston, TX, USA
 SIAM Conference on Computational Science and Engineering, San Diego, CA, USA
 SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin, TX, USA
 USNCCM, Albuquerque, NM, USA

- 2004 * Computational Infrastructure in Geodynamics (www.geodynamics.org), planning workshop, Los Angeles, CA, USA
 Finite Element Rodeo, Austin, TX, USA
- * Supercomputing 2004, Pittsburgh, PA, USA
- 2005 * Photonics West/Optical Tomography and Spectroscopy of Tissue VII, San Jose, CA, USA
 SIAM Conference on Computational Science and Engineering, Orlando, FL, USA
- 2006 *+ deal.II User Workshop, Heidelberg, Germany
 IEEE International Symposium on Biomedical Imaging (ISBI), Arlington, VA, USA, 2006
 SIAM Conference on Imaging, Minneapolis, MN, USA, 2006
- *+ European Conference on Object Oriented Programming (ECOOP), Nantes, France, 2006
- *+ Workshop on Computational Science Issues in Geodynamics Applications, Austin, TX, 2006
- 2007 * SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, 2007
- * IEEE International Symposium on Biomedical Imaging (ISBI), Arlington, VA, USA, 2007
- * Oberwolfach seminar on adaptivity and error estimation Oberwolfach, Germany, 2007
- * Applied Inverse Problems conference, Vancouver, Canada, 2007
- * ICCOPT-MOPTA 2007 conference, Hamilton, Canada, 2007
- * MAMOS workshop, Austin, TX, October, 2007
- *+ Main speaker (19 hours) of a “Workshop on Adaptive Mesh Refinement Techniques in Geodynamics Applications”, Boulder, CO, October 24-27, 2007
- 2008 * CT 2008 – Tomography Confluence, An International Conference on the Applications of Computerized Tomography; Indian Institute of Technology Kanpur, India, February 15–17, 2008
- * SIAM Conference on Parallel Processing for Scientific Computing; Atlanta, GA, March 12–14, 2008
- *+ Mathematical and Computational Issues in the Solid Earth Geosciences; Santa Fe, NM, September 15–17, 2008
- 2009 * SIAM Conference on Computational Science and Engineering; Miami, FL, March 2–6, 2009
 ACM Symposium on Applied Computing; Honolulu, HI, March 9–12, 2009
- * Finite Elements in Fluids 2009; Tokyo, Japan, April 1–3, 2009

- * Compatible and Innovative Discretizations for Partial Differential Equations; Oslo, Norway, June 17–19, 2009
- * Numerical Modeling of Crustal Deformation and Earthquake Faulting; Golden, CO, June 22–26, 2009

Other presentations:

Colloquium, Institute for Geophysics, Technical University of Munich (1999)
 Colloquium, Institute for Geophysics, Technical University of Munich (2001)
 Presentation, Industrial Research Ltd., Wellington, New Zealand (2001)
 Colloquium, Seminar for Applied Mathematics, ETH Zürich (2002)
 Colloquium, Photon Migration Laboratories, Texas A&M University (2003)
 Colloquium, Applied Mathematics, University of Heidelberg (2003)
 Colloquium, Computational and Applied Mathematics, Rice University (2004)
 Colloquium, Department of Mathematics, University of Pittsburgh (2004)
 Colloquium, Department of Mathematics, University of Pittsburgh (2005)
 Colloquium, Department of Mathematics, University of Colorado/Denver (2005)
 Colloquium, Department of Mathematics, Colorado State University (2005)
 Colloquium, Department of Mathematics, Texas A&M University (2005)
 Colloquium, Division of Mathematics, Sandia National Laboratories (2005)
 Colloquium, Department of Mathematics, Colorado State University (2005)
 Colloquium, Applied Mathematics, University of Heidelberg (2006)
 Colloquium, Institute for Computational and Applied Mathematics (ICES),
 University of Texas at Austin (2007)
 Colloquium, Electrical Engineering Department, Katholieke Universiteit
 Leuven, Belgium (2007)
 Colloquium, Department of Mathematics, University of Houston (2007)
 Colloquium, Department of Mathematics, Indian Institute of Technology
 Kanpur, India (2008)
 Colloquium, Department of Mathematics and Statistics, McGill University,
 Montreal, Canada (2008)
 Colloquium, Department of Mathematics, Southern Methodist University (2009)
 Colloquium, Institute for Computational Engineering and Sciences, University
 of Texas at Austin (2009)

Support

Funded support:

- NSF award DGE-0549487: “IGERT: New materials and mathematical modeling” (6/1/2006–5/31/2011): Research advisor; PI: Joe Ross, Texas A&M; \$2,817,300.
- NSF award DMS-0604778: “Mathematical Methods for Novel Modalities of Medical Imaging” (9/1/2006–8/31/2009), co-PI; PI: Peter Kuchment, Texas A&M; \$330,276 + a supplement of \$55,905.
- DoE: “3-D deep penetration neutron imaging of thick absorbing and diffusive objects using transport theory” (5/1/2007–4/30/2010): co-PI; PI: Jean Ragusa, Texas A&M; \$283,093.

- NSF award CBET-0736202 transferred to the Department of Homeland Security, grant 2008-DN-077-ARI018-02): “A framework for developing novel detection systems focused on interdicting shielded HEU” (9/1/2007–8/31/2012): co-PI; PI: Warren Miller, Texas A&M; \$7,496,076.
- Computational Infrastructure in Geodynamics (an NSF-funded research center): “A suite of simple geodynamics applications using adaptive finite element methods” (4/1/2008–10/31/2009): PI; \$100,458.
- Sloan Foundation Research Fellowship: “Inverse Problems and Computational Science” (9/1/2008–8/31/2010): PI; \$50,000.
- King Abdullah University of Science and Technology: “Institute for Applied Mathematics and Computational Science (IAMCS) at Texas A&M University” (4/1/2008–3/31/2013): collaborator; \$24,720,657.
- NSF award DMS-0834176: “NSF/CBMS Regional Conference in the Mathematical Sciences - Adaptive Finite Element Methods for Partial Differential Equations” (5/18/09–5/22/09): co-PI; PI: Guido Kanschat, Texas A&M; \$33,731.
- Institute for Applied Mathematics and Computational Science (Texas A&M University) Innovation Award: “Exploiting sparsity in solving geoscience inverse problems” (1/1/2010–8/31/2010): PI; \$20,000.

Past support:

- Deutsche Forschungsgemeinschaft (DFG, German Science Foundation) post-doctoral stipend for research at the University of Texas at Austin (9/2002–8/2003); declined in favor of a stipend from the Institute for Computational Engineering and Sciences, The University of Texas at Austin.
- NIH: “Diagnostic cancer imaging with NIR fluorescence” (7/1/2005–6/30/2008): PI; subaward over \$173,124 to a grant of \$3M.

Articles written about my work

- [1] William Bell. Good prospects. *Access, the quarterly journal of NCSA*, 18(1):1–4, 2005.
This article also appeared in the *GRIDSTART Business Newsletter*, March 2005, pp. 6-8, as well as *GRID today*, edition of March 28, 2005.
- [2] Developers of finite element library receive Wilkinson prize for numerical software. *SIAM News*, 40(9):7–8, November 2007.

Books

- [1] Wolfgang Bangerth and Rolf Rannacher. *Adaptive Finite Element Methods for Differential Equations*. Birkhäuser Verlag, 2003.

Peer reviewed articles

- [1] Wolfgang Bangerth and Rolf Rannacher. Finite element approximation of the acoustic wave equation: Error control and mesh adaptation. *East–West J. Numer. Math.*, 7(4):263–282, 1999.
- [2] Wolfgang Bangerth and Rolf Rannacher. Adaptive finite element techniques for the acoustic wave equation. *J. Comput. Acoustics*, 9(2):575–591, 2001.
- [3] Wolfgang Bangerth. Starting threads in a C++ compatible fashion. *C/C++ Users Journal*, pages 21–24, October 2003.
- [4] Wolfgang Bangerth, Marcus Grote, and Christel Hohenegger. Finite element method for time dependent scattering: Nonreflecting boundary condition, adaptivity, and energy decay. *Comp. Meth. Appl. Mech. Engrg.*, 193:2453–2482, 2004.
- [5] Graham F. Carey, William Barth, Juliette A. Woods, Ben Kirk, Michael L. Anderson, Sum Chow, and Wolfgang Bangerth. Modeling error and constitutive relations in simulation of flow and transport. *International Journal for Numerical Methods in Fluids*, 46:1211–1236, 2004.
- [6] Hector Klie, Wolfgang Bangerth, Mary Wheeler, Manish Parashar, and Vincent Matossian. Parallel well location optimization using stochastic algorithms on the grid computational framework. In *Proceedings of the 9th European Conference on the Mathematics of Oil Recovery (ECMOR IX), Cannes, France*, 2004.
- [7] Amit Joshi, Wolfgang Bangerth, and Eva M. Sevick-Muraca. Adaptive finite element modeling of optical fluorescence-enhanced tomography. *Optics Express*, 12(22):5402–5417, November 2004.
- [8] Amit Joshi, Wolfgang Bangerth, Alan B. Thompson, and Eva M. Sevick-Muraca. Experimental fluorescence optical tomography using adaptive finite elements and planar illumination with modulated excitation light. *Progr. Biomed. Optics Imag.*, 6:351–358, 2005.

- [9] Wolfgang Bangerth, Amit Joshi, and Eva M. Sevick-Muraca. Adaptive finite element methods for increased resolution in fluorescence optical tomography. *Progr. Biomed. Optics Imag.*, 6:318–329, 2005.
- [10] Wolfgang Bangerth, Hector Klie, Vincent Matossian, Manish Parashar, and Mary Wheeler. An autonomic reservoir framework for the stochastic optimization of well placement. *Cluster Computing*, 8:255–269, 2005.
- [11] Michael Anderson, Wolfgang Bangerth, and Graham F. Carey. Analysis of parameter sensitivity and experimental design for a class of nonlinear partial differential equations. *Int. J. Numer. Meth. Fluids*, 48:583–605, 2005.
- [12] Manish Parashar, Hector Klie, Umit Catalyurek, Tahsin Kurc, Wolfgang Bangerth, Vincent Matossian, Joel Saltz, and Mary F. Wheeler. Application of grid-enabled technologies for solving optimization problems in data-driven reservoir studies. *Future Generation Computer Systems*, 21:19–26, 2005.
- [13] Amit Joshi, Wolfgang Bangerth, Kildong Hwang, John C. Rasmussen, and Eva M. Sevick-Muraca. Plane wave fluorescence tomography with adaptive finite elements. *Optics Letters*, 31:193–195, 2006.
- [14] Amit Joshi, Wolfgang Bangerth, and Eva M. Sevick-Muraca. Non-contact fluorescence optical tomography with scanning area illumination. In *Proceedings of the IEEE International Symposium on Biomedical Imaging, Arlington, VA, 2006*, pages 582–585. IEEE, 2006.
- [15] Amit Joshi, Wolfgang Bangerth, Kildong Hwang, John C. Rasmussen, and Eva M. Sevick-Muraca. Fully adaptive FEM based fluorescence optical tomography from time-dependent measurements with area illumination and detection. *Med. Phys.*, 33(5):1299–1310, 2006.
- [16] Amit Joshi, Wolfgang Bangerth, and Eva M. Sevick-Muraca. Non-contact fluorescence optical tomography with scanning patterned illumination. *Optics Express*, 14(14):6516–6534, 2006.
- [17] Wolfgang Bangerth, Hector Klie, Mary F. Wheeler, Paul Stoffa, and Mrinal Sen. On optimization algorithms for the reservoir oil well placement problem. *Comp. Geosciences*, 10:303–319, 2006.
- [18] Hector Klie, Wolfgang Bangerth, Xiuli Gai, Mary F. Wheeler, Paul L. Stoffa, Mrinal Sen, M. Parashar, Umit Catalyurek, Joel Saltz, and Tahsin Kurc. Models, methods and middleware for Grid-enabled multiphysics oil reservoir management. *Engineering with Computers*, 22:349–370, 2006.
- [19] Kildong Hwang, Tianshu Pan, Amit Joshi, John C. Rasmussen, Wolfgang Bangerth, and Eva M. Sevick-Muraca. Influence of excitation light rejection on forward model mismatch in optical tomography. *Phys. Med. Biol.*, 51(22):5889–5902, 2006.

- [20] Wolfgang Bangerth, Ralf Hartmann, and Guido Kanschat. deal.II – a general purpose object oriented finite element library. *ACM Trans. Math. Softw.*, 33(4):24/1–24/27, 2007.
- [21] Amit Joshi, Wolfgang Bangerth, Ruchi Sharma, Wei Wang, and Eva M. Sevick-Muraca. Molecular tomographic imaging of lymph nodes with NIR fluorescence. In *Proceedings of the IEEE International Symposium on Biomedical Imaging, Arlington, VA, 2007*, pages 564–567. IEEE, 2007.
- [22] Wolfgang Bangerth, Amit Joshi, and Eva M. Sevick-Muraca. Inverse biomedical imaging using separately adapted meshes for parameters and forward model variables. In *Proceedings of the IEEE International Symposium on Biomedical Imaging, Arlington, VA, 2007*, pages 1368–1371. IEEE, 2007.
- [23] Wolfgang Bangerth. A framework for the adaptive finite element solution of large inverse problems. *SIAM J. Sc. Comput.*, 30:2965–2989, 2008.
- [24] Wolfgang Bangerth and Amit Joshi. Adaptive finite element methods for the solution of inverse problems in optical tomography. *Inverse Problems*, 24:034011/1–22, 2008¹
- [25] Marc Bartels, Amit Joshi, John C. Rasmussen, Eva M. Sevick-Muraca, and Wolfgang Bangerth. Post-image acquisition excitation light mitigation in NIR fluorescent tomography. In *Proceedings of the IEEE International Symposium on Biomedical Imaging, Arlington, VA, 2008*. IEEE, 2008.
- [26] Amit Joshi, Wolfgang Bangerth, and Eva Sevick. Non-contact fluorescence optical tomography with adaptive finite element methods. In Y. Censor, M. Jiang, and A. K. Louis, editors, *Mathematical Methods in Biomedical Imaging and Intensity-Modulated Radiation Therapy (IMRT)*, pages 185–200. Birkhäuser, 2008.
- [27] Wolfgang Bangerth and Oliver Kayser-Herold. Data structures and requirements for *hp* finite element software. *ACM Trans. Math. Softw.*, 36(1):4/1–4/31, 2009.
- [28] Yaqi Wang, Wolfgang Bangerth, and Jean Ragusa. Three-dimensional *h*-adaptivity for the multigroup neutron diffusion equations. *Progr. Nucl. Energy*, 51:543–555, 2009.
- [29] B. Turcksin, J. C. Ragusa, and W. Bangerth. Goal-oriented *h*-adaptivity for the multigroup SP_N equations. Technical Report 2009-068, Institute for Applied Mathematics and Computational Sciences, Texas A&M University, 2009.

¹This article is was selected for the Editorial Board Highlights 2008 of the Journal “Inverse Problems”.

Software

- [1] Wolfgang Bangerth, Ralf Hartmann, and Guido Kanschat. deal.II *Differential Equations Analysis Library*. <http://www.dealii.org/>.

Freely available versions of the Open Source deal.II software are periodically released. The latest release 6.2 was made available in April 2009, see

<http://www.dealii.org/developer/news/news.html>

deal.II is widely used around the world in research and teaching. An attempt at listing all publications prepared using the library can be found at

<http://www.dealii.org/developer/publications/toc.html>

Proceedings articles (not peer reviewed)

- [1] Wolfgang Bangerth. Mesh adaptivity and error control for a finite element approximation of the elastic wave equation. In Alfredo Bermúdez, Dolores Gómez, Christophe Hazard, Patrick Joly, and Jean E. Roberts, editors, *Proceedings of the Fifth International Conference on Mathematical and Numerical Aspects of Wave Propagation (Waves2000)*, Santiago de Compostela, Spain, 2000, pages 725–729. SIAM, 2000.
- [2] Wolfgang Bangerth. Using modern features of C++ for adaptive finite element methods: Dimension-independent programming in deal.II. In Michel Deville and Robert Owens, editors, *Proceedings of the 16th IMACS World Congress 2000, Lausanne, Switzerland, 2000*, 2000. Document Sessions/118-1.
- [3] Amit Joshi, Wolfgang Bangerth, Alan B. Thompson, and Eva M. Sevick-Muraca. Adaptive finite element methods for fluorescence enhanced frequency domain optical tomography: Forward imaging problem. In *Proceedings of the 2004 IEEE International Symposium on Biomedical Imaging*, pages 1103–1106, 2004.
- [4] Ralf B. Schulz, Jörg Peter, Wolfhard Semmler, and Wolfgang Bangerth. Independent modeling of fluorescence excitation and emission. In *Proceedings of the 2004 OSA Biomedical Topical Meetings*, 2004.
- [5] Amit Joshi, Alan B. Thompson, Eva M. Sevick-Muraca, and Wolfgang Bangerth. Adaptive finite element methods for forward modeling in fluorescence enhanced frequency domain optical tomography. In *Proceedings of the 2004 OSA Biomedical Topical Meetings*, 2004.
- [6] Manish Parashar, Vincent Matossian, Wolfgang Bangerth, Hector Klie, Benjamin Rutt, Tahsin Kurc, Umit Catalyurek, Joel Saltz, and Mary F. Wheeler. Towards dynamic data-driven optimization of oil well placement. In Vaidy S. Sunderam, Geert Dick van Albada, Peter M. A. Sloot, and et al., editors, *Computational Science – ICCS 2005: 5th International Conference, Atlanta, GA, USA, May 22-25, 2005. Part II*, pages 656–663, 2005.

- [7] Paul L. Stoffa, Mrinal K. Sen, Roustam Seifoullaev, Hector Klie, Xiuli Gai, Wolfgang Bangerth, Jaroon Rungamornrat, and Mary F. Wheeler. An analysis of flow-simulation scales and seismic response. In *Proceedings of the SEG*, 2005.
- [8] G. Thoreson, J. C. Ragusa, and W. Bangerth. Some advances on inverse particle transport problems with applications to homeland security. *Trans. Am. Nucl. Soc.*, 95:534–537, 2006.
- [9] Wolfgang Bangerth and Amit Joshi. Adaptive finite element methods for nonlinear inverse problems. In D. Shin, editor, *Proceedings of the 24rd ACM Symposium on Applied Computing, March 8–12, 2009, Honolulu, Hawaii*, volume 2, pages 1002–1006. ACM, 2009.

Theses

- [1] Wolfgang Bangerth. Adaptive Finite-Elemente-Methoden zur Lösung der Wellengleichung mit Anwendung in der Physik der Sonne. Diplomarbeit, Institut für Angewandte Mathematik, Universität Heidelberg, 1998.
- [2] Wolfgang Bangerth. *Adaptive Finite Element Methods for the Identification of Distributed Parameters in Partial Differential Equations*. PhD thesis, University of Heidelberg, 2002.

Reports and preprints that have not since been published elsewhere

- [1] Wolfgang Bangerth and Guido Kanschat. Concepts for object-oriented finite element software – the `deal.II` library. Preprint 99-43 (SFB 359), IWR Heidelberg, October 1999.
- [2] Wolfgang Bangerth. Multi-threading support in `deal.II`. Preprint 2000-11, April 2000.

Articles in preparation and submitted articles

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