

List of Publications of Peter Bastian

September 5, 2017

Refereed Journal Publications

- [1] P. Bastian and G. Horton. Parallelization of robust multigrid methods: Ilu factorization and frequency decomposition method. *SIAM J. Sci. Stat. Comput.*, 12(6):1457–1470, 1991.
- [2] P. Bastian, K. Birken, S. Lang, K. Johannsen, N. Neuß, H. Rentz-Reichert, and C. Wieners. UG: A flexible software toolbox for solving partial differential equations. *Computing and Visualization in Science*, 1:27–40, 1997.
- [3] P. Bastian, K. Eckstein, and S. Lang. Parallel adaptive multigrid methods in plane linear elasticity problems. *Numerical Linear Algebra with Applications*, 4(3):153 – 176, 1997.
- [4] P. Bastian. Load balancing for adaptive multigrid methods. *SIAM J. Sci. Stat. Comput.*, 19(4):1303–1321, 1998.
- [5] R. Helmig, H. Class, R. Huber, H. Sheta, J. Ewing, R. Hinkelmann, H. Jakobs, and P. Bastian. Architecture of the modular program system MUFTE–UG for simulating multiphase flow and transport processes in heterogeneous porous media. *Mathematische Geologie*, 1998. Band 2.
- [6] P. Bastian, W. Hackbusch, and G. Wittum. Additive and multiplicative multigrid – a comparison. *Computing*, 60:345–368, 1998.
- [7] P. Bastian and R. Helmig. Efficient fully-coupled solution techniques for two-phase flow in porous media. Parallel multigrid solution and large scale computations. *Adv. Water Res.*, 23:199–216, 1999.
- [8] H. Class, R. Helmig, and P. Bastian. Numerical simulation of non-isothermal multiphase multicomponent processes in porous media. 1. An efficient solution technique. *Adv. Wat. Res.*, 25(5):533–550, 2002.
- [9] P. Bastian and B. Rivière. Superconvergence and H(div)-projection for discontinuous Galerkin methods. *Int. J. Numer. Meth. Fluids.*, 42(10):1043–1057, 2003.
- [10] P. Bastian and S. Lang. Coupled benchmark computations with UG. *Computational Geosciences*, 8(2):125–147, 2004.
- [11] V. Reichenberger, H. Jakobs, P. Bastian, and R. Helmig. A mixed-dimensional finite volume method for multiphase flow in fractured porous media. *Adv. Wat. Res.*, 29(7):1020–1036, 2006.

- [12] T. Neubauer and P. Bastian. On a monotonicity preserving Eulerian-Lagrangian localized adjoint method for advection-diffusion equations. *Adv. Wat. Res.*, 28(12):1292–1309, 2005.
- [13] I. A. Watson, R. S. Crouch, P. Bastian, and S. E. Oswald. Advantages of using adaptive remeshing and parallel computing for modelling biodegradation in groundwater. *Adv. Wat. Res.*, 28(11):1143–1158, 2005.
- [14] P. Bastian and C. Wieners. Multigrid methods on adaptively refined grids. *IEEE Computing in Science and Engineering*, 8(6):44–54, 2006.
- [15] O. Ippisch, H.-J. Vogel, and P. Bastian. Validity limits for the van genuchten-mualem model and implications for parameter estimation and numerical simulation. *Advances in Water Resources*, 29(12):1780–1789, 2006.
- [16] H.-J. Vogel, I. Cousin, O. Ippisch, and P. Bastian. The dominant role of structure for solute transport in soil. experimental evidence and modelling of structure and transport. *Hydrol. Earth Syst. Sci.*, 10(4):495–506, 2006.
- [17] P. S. Drouvelis, P. Schmelcher, and P. Bastian. Parallel implementation of the recursive Green’s function method. *Journal of Computational Physics*, 215(2):741–756, 2006. arXiv:cond-mat/0507415.
- [18] P. Bastian, M. Blatt, A. Dedner, C. Engwer, R. Klöfkorn, M. Ohlberger, and O. Sander. A generic grid interface for parallel and adaptive scientific computing. part I: abstract framework. *Computing*, 82(2-3):103–119, 2008.
- [19] P. Bastian, M. Blatt, A. Dedner, C. Engwer, R. Klöfkorn, R. Kornhuber, M. Ohlberger, and O. Sander. A generic grid interface for parallel and adaptive scientific computing. part II: implementation and tests in DUNE. *Computing*, 82(2-3):121–138, 2008.
- [20] P. Bastian and M. Blatt. On the generic parallelisation of iterative solvers for the finite element method. *Int. J. Computational Science and Engineering*, 4(1):56–69, 2008.
- [21] P. Bastian, A. Chavarria-Krauser, C. Engwer, W. Jäger, S. Marnach, and M. Ptashnyk. Modelling in vitro growth of dense root networks. *Journal of Theoretical Biology*, 254(1):99–109, 2008.
- [22] C. Engwer and P. Bastian. An unfitted finite element method using Discontinuous Galerkin. *Int. J. Num. Meth. in Engineering*, 79(12):1557–1576, 2009.
- [23] Markus Blatt and Peter Bastian. C++ components describing parallel domain decomposition and communication. *International Journal of Parallel, Emergent and Distributed Systems*, 24(6):467–477, 2009.
- [24] Peter Bastian, Christian Engwer, Jorrit Fahlke, and Olaf Ippisch. An unfitted discontinuous galerkin method for pore-scale simulations of solute transport. *Mathematics and Computers in Simulation*, 81(10):2051 – 2061, 2011.
- [25] P. Bastian, F. Heimann, and S. Marnach. Generic implementation of finite element methods in the distributed and unified numerics environment (DUNE). *Kybernetika*, 46(2):294–315, 2010.

- [26] S. Lang, P. Drouvelis, E. Tafaj, P. Bastian, and B. Sakmann. Fast extraction of neuron morphologies from large-scale sbfsem image stacks. *J. Comput Neurosci*, 31(3):533–545, 2011.
- [27] Peter Bastian, Markus Blatt, and Robert Scheichl. Algebraic multigrid for discontinuous galerkin discretizations of heterogeneous elliptic problems. *Numerical Linear Algebra with Applications*, 19(2):367–388, 2012.
- [28] F. Heimann, C. Engwer, O. Ippisch, and P. Bastian. An unfitted interior penalty discontinuous galerkin method for incompressible navier–stokes two-phase flow. *International Journal for Numerical Methods in Fluids*, 71(3):269–293, 2013.
- [29] H. Remmel, B. Paech, C. Engwer, and P. Bastian. A case study on a quality assurance process for a scientific framework. *Computing in Science & Engineering*, 16(3):58–66, May 2014.
- [30] Ronnie L. Schwede, Adrian Ngo, Peter Bastian, Olaf Ippisch, Wei Li, and Olaf A. Cirpka. Efficient parallelization of geostatistical inversion using the quasi-linear approach. *Computers & Geosciences*, 44(0):78 – 85, 2012.
- [31] S. Schlüter, H.-J. Vogel, O. Ippisch, P. Bastian, K. Roth, G. Schenk, H. Schelle, W. Durner, R. Kasteel, and J. Vanderborght. Virtual soils: Assessment of the effects of soil structure on the hydraulic behavior of cultivated soils. *Vadose Zone Journal*, 11(4), 2012.
- [32] Rebecca Neumann, Peter Bastian, and Olaf Ippisch. Modeling and simulation of two-phase two-component flow with disappearing nonwetting phase. *Computational Geosciences*, 17(1):139–149, 2013.
- [33] H. Remmel, B. Paech, P. Bastian, and C. Engwer. System testing for scientific software using a regression test environment. *Computing in Science and Engineering*, 14(2):38–45, 2012.
- [34] Peter Bastian. A fully-coupled discontinuous galerkin method for two-phase flow in porous media with discontinuous capillary pressure. *Computational Geosciences*, 18(5):779–796, 2014.
- [35] Juan Pablo Gallego-Valencia, Johannes Löbbert, Steffen Müthing, Peter Bastian, Christian Klingenberg, and Yinhua Xia. Implementing a discontinuous galerkin method for the compressible, inviscid euler equations in the dune framework. *PAMM*, 14(1):953–954, 2014.
- [36] A.Q.T. Ngo, P. Bastian, and O. Ippisch. Numerical solution of steady-state groundwater flow and solute transport problems: Discontinuous galerkin based methods compared to the streamline diffusion approach. *Computer Methods in Applied Mechanics and Engineering*, 294:331 – 358, 2015.
- [37] P. Hron, D. Jost, P. Bastian, C. Gallert, J. Winter, and O. Ippisch. Application of reactive transport modeling to growth and transport of microorganisms in the capillary fringe. *Vadose Zone Journal*, 14(5), 2015.
- [38] Ole Klein, Olaf A. Cirpka, Peter Bastian, and Olaf Ippisch. Efficient geostatistical inversion of transient groundwater flow using preconditioned nonlinear conjugate gradients. *Advances in Water Resources*, 102:161 – 177, 2017.

- [39] M. Piatkowski, S. Müthing, and P. Bastian. A stable and high-order accurate discontinuous galerkin based splitting method for the incompressible navier-stokes equations. *arXiv:1612.00657*, submitted to *Journal of Computational Physics*, 2016.

Refereed Proceedings Publications

- [40] P. Bastian. Higher order discontinuous galerkin methods for flow and transport in porous media. In E. Bänsch, editor, *Challenges in Scientific Computing – CISC 2002*, number 35 in LNCSE, pages 1–22, 2003.
- [41] M. Blatt and P. Bastian. The iterative solver template library. In B. Kagström, E. Elmroth, J. Dongarra, and J. Wasniewski, editors, *Applied Parallel Computing. State of the Art in Scientific Computing*, number 4699 in Lecture Notes in Scientific Computing, pages 666–675, 2007.
- [42] C. Engwer, P. Bastian, and S. P. Kuttanikkad. An Unfitted Discontinuous Galerkin Finite Element Method for Pore Scale Simulations. In *9th International Workshop on State-of-the-Art in Scientific and Parallel Computing*, LNCS. Springer-Verlag, 2008. accepted for publication.
- [43] S. Lang, E. Tafaj, and P. Bastian. Reconstruction of neuronal structures from em-data by 3d-segmentation operators. In Arjan Kuiper, Bettina Heise, and Leila Muresan, editors, *Challenges in the Biosciences: Image Analysis and Pattern Recognition Aspects*, volume 232 of *OAGM Workshop proceedings*, 2008. ISBN 978-3-85403-232-8.
- [44] H. Valtokari, B. Paech, C. Engwer, and P. Bastian. Supporting testing of scientific frameworks using software product line engineering — a proposed approach. In J. Carver, editor, *Fourth International Workshop on Software Engineering for Computational Science and Engineering*, 2011.
- [45] Peter Bastian. Benchmark 3d: Symmetric weighted interior penalty discontinuous galerkin scheme. In Jaroslav Fořt, Jiří Fürst, Jan Halama, Raphaële Herbin, and Florence Hubert, editors, *Finite Volumes for Complex Applications VI: Problems & Perspectives*, volume 4 of *Springer Proceedings in Mathematics*, pages 949–959. Springer Berlin Heidelberg, 2011.
- [46] P. Bastian, H. Berninger, A. Dedner, C. Engwer, P. Henning, R. Kornhuber, D. Kröner, M. Ohlberger, O. Sander, G. Schiffler, N. Shokina, and K. Smetana. Adaptive modelling of coupled hydrological processes with application in water management. In Michael Günther, Andreas Bartel, Markus Brunk, Sebastian Schöps, and Michael Striebel, editors, *Progress in Industrial Mathematics at ECMI 2010*, volume 17 of *Mathematics in Industry*, pages 561–567. Springer Berlin Heidelberg, 2012.
- [47] Peter Bastian, Christian Engwer, Dominik Göttsche, Oleg Iliev, Olaf Ippisch, Mario Ohlberger, Stefan Turek, Jorrit Fahlke, Sven Kaulmann, Steffen Müthing, and Dirk Ribbrock. EXA-DUNE: Flexible PDE solvers, numerical methods and applications. In Luís Lopes, Julius Žilinskas, Alexandru Costan, Roberto G. Cascella, Gabor Kecskemeti, Emmanuel Jeannot, Mario Cannataro, Laura Ricci, Siegfried Benkner, Salvador Petit, Vittorio Scarano, José Gracia, Sascha Hunold, Stephen L. Scott, Stefan Lankes, Christian Lengauer, Jesús Carretero, Jens Breitbart, and Michael Alexander, editors, *Euro-Par 2014: Parallel Processing Workshops*, volume 8806 of *Lecture Notes in Computer Science*, pages 530–541. Springer International Publishing, 2014.

- [48] Peter Bastian, Christian Engwer, Jorrit Fahlke, Markus Geveler, Dominik Göldeke, Oleg Iliev, Olaf Ippisch, René Milk, Jan Mohring, Steffen Müthing, Mario Ohlberger, Dirk Ribbrock, and Stefan Turek. *Hardware-Based Efficiency Advances in the EXA-DUNE Project*, pages 3–23. Springer, 2016.
- [49] Peter Bastian, Christian Engwer, Jorrit Fahlke, Markus Geveler, Dominik Göldeke, Oleg Iliev, Olaf Ippisch, René Milk, Jan Mohring, Steffen Müthing, Mario Ohlberger, Dirk Ribbrock, and Stefan Turek. *Advances Concerning Multiscale Methods and Uncertainty Quantification in EXA-DUNE*, pages 25–43. Springer, 2016.

Thesis etc.

- [50] P. Bastian. Die Frequenzerlegungsmethode als robustes Mehrgitterverfahren: Implementierung und Parallelisierung. Technical Report 10, Diplomarbeit Universität Erlangen, Erlangen, 1989. Arbeitsberichte des Instituts für mathematische Maschinen und Datenverarbeitung (Informatik), Band 22.
- [51] P. Bastian. *Parallele adaptive Mehrgitterverfahren*. PhD thesis, Universität Heidelberg, 1994. ICA-Bericht 94–1.
- [52] P. Bastian. Numerical computation of multiphase flow in porous media. Habilitationsschrift, 1999.

Books

- [53] P. Bastian. *Parallele adaptive Mehrgitterverfahren*. Teubner Skripten zur Numerik. Teubner-Verlag, 1996.
- [54] P. Luksch, U. Maier, S. Rathmeier, M. Weidmann, F. Unger, P. Bastian, V. Reichenberger, and A. Haas. *Software Engineering Methods for Parallel Applications in Scientific Computing — Project Report*. Shaker, 1998. ISBN 3-8265-4503-6.