

Sven Beuchler



Academic career

1999	Dipl. Math., TU Chemnitz
2003	Dr. rer. nat., TU Chemnitz
2003 - 2008	Postdoc, RICAM/JKU Linz, Austria
2008	Habilitation (Priv.-Doz.), JKU Linz, Austria
2008 - 2010	Senior-Postdoc, RICAM Linz, Austria
Since 2011	Professor (C3), University of Bonn

Invited Lectures

2011	HOFEIM 2011: Higher Order Finite Element and Isogeometric Methods, Krakow, Poland
------	---

Research Projects and Activities

FWF-project P20121-N18, “Fast hp-solvers for elliptic and mixed problems”

Project leader, 2008 - 2011, 1 PhD position

DFG Collaborative Research Center SFB 1060 “The Mathematics of Emergent Effects”, Project B7

together with Mario Bebendorf, 2013 - 2015, 1 PhD position

FWF-project P23484-N18, “hp-FEM for optimal control problems”

Co-project leader, 2011 - 2016, 2 PhD positions together with D. Wachsmuth

Research profile

My main research area is the analysis and implementation of fast solution algorithms for the approximate solution of boundary value problems of elliptic partial differential equations. On the one hand, this includes efficient discretization schemes based on hp finite elements, see e.g. [6] and [4] for optimal control problems. On the other hand, the solution of the discretized problem has to be done very fast. This requires the construction of suitable quasiorthogonal basis functions on triangular and tetrahedral finite element meshes [9], as well as efficient solvers based on multilevel and domain decomposition techniques [5],[8].

Research Area B I started in Bonn in January, 2011.

One research area of the last years was the development of interface concentrated finite element solvers [6] and the application of interface concentrated finite element methods for discretizations of optimal control problems with Neumann boundary control [4].

Supervised theses

Master theses: 3

PhD theses: 1

Selected PhD students

Katharina Hofer (current PhD student, 2012 - 2016)

Selected publications

- [1] S. Beuchler, K. Hofer, D. Wachsmuth, and J.-E. Wurst. Boundary concentrated finite elements for optimal control problems with distributed observation. *Comput. Optim. Appl.*, 62(1):31–65, 2015.
- [2] Sven Beuchler, Veronika Pillwein, and Sabine Zaglmayr. Sparsity optimized high order finite element functions for $h(\text{curl})$ on tetrahedra. *Adv. in Appl. Math.*, 50(5):749–769, 2013.
- [3] Sven Beuchler, Veronika Pillwein, and Sabine Zaglmayr. Sparsity optimized high order finite element functions for $H(\text{div})$ on simplices. *Numer. Math.*, 122(2):197–225, 2012.
- [4] Sven Beuchler, Clemens Pechstein, and Daniel Wachsmuth. Boundary concentrated finite elements for optimal boundary control problems of elliptic pdes. *Comput. Optim. Appl.*, 51(2):883–908, 2012.

- [5] Sven Beuchler. Wavelet solvers for hp-fem discretizations in 3d using hexahedral elements. *Comput. Methods Appl. Mech. Engrg.*, 198(13-14):1138–1148, 2009.
- [6] Sven Beuchler, Tino Eibner, and Ulrich Langer. Primal and dual interface concentrated iterative substructuring methods. *SIAM J. Numer. Anal.*, 46(6):2818–2842, 2008.
- [7] Sven Beuchler and Sergey V. Nepomnyaschikh. Overlapping additive schwarz preconditioners for elliptic problems with degenerate locally anisotropic coefficients. *SIAM J. Numer. Anal.*, 45(6):2321–2344, 2007.
- [8] Sven Beuchler and Dietrich Braess. Improvements for some condition number estimates for preconditioned system in p-fem. *Numer. Linear Algebra Appl.*, 13(7):573–588, 2006.
- [9] S. Beuchler and J. Schöberl. New shape functions for triangular p-fem using integrated jacobi polynomials. *Numer. Math.*, 103(3):339–366, 2006.
- [10] S. Beuchler, R. Schneider, and C. Schwab. Multiresolution weighted norm equivalences and applications. *Numer. Math.*, 98(1):67–97, 2004.
- [11] Sven Beuchler. Multigrid solver for the inner problem in domain decomposition methods for p-fem. *SIAM J. Numer. Anal.*, 40(3):928–944, 2002.