Dr. Jeffrey S. Ovall

Home

Research

$$A \in \mathbb{R}^{n\times n}$$
$$a_{ij} = \gcd(i,j)$$
$$\det(A) = ??$$

Teaching

Links

Weekly Seminar in Applied and Computational Mathematics

Maseeh Colloquim Series

The EigenProject Website

Publications

1. The Laplacian and Mean and Extreme Values, *American Mathematical Monthly*, to appear (2016).
2. (with H. Li) A posteriori eigenvalue error estimation for the Schrödinger operator with inverse square potential, *Discrete and Continuous Dynamical Systems--Series B*, Vol. 20, No. 5, pp 1377-1391 (2015).
3. (with H. Hakula, and M. Neilan) A posteriori estimates using auxiliary subspace techniques, submitted (2014).
4. (with S. Giani, L. Grubišić and A. Międlar) Robust estimates for hp-adaptive approximations of non-self-adjoint eigenvalue problems, *Numerische Mathematik*, online (2015).
5. (with H. Li) A posteriori estimation of hierarchical type for the Schrödinger operator with inverse square potential on graded meshes, *Numerische Mathematik*, online (2014).
6. (with S. Giani and L. Grubišić) Benchmark results for testing adaptive finite element eigenvalue procedures II: cluster-robust eigenvector and eigenvalue estimates, submitted (2012).
7. (with R. Bank and L. Grubišić) A framework for robust eigenvalue and eigenvector error estimation and ritz value convergence enhancement, *Applied Numerical Mathematics*. Vol. 66, pp. 1--29 (2013).
8. (with S. Giani and L. Grubišić) Error control for hp-adaptive approximations of semi-definite eigenvalue problems, *Computing*, pp. 1-23, (Online December 2012). **Note: The legends for the convergence plots (Figures 2a, 4a, 6a, 7a, 9a, 10a) are incorrect. The green curves correspond to pure h-refinment, and the blue curves to hp-refinement. In all cases, the dashed curves correspond to our a posteriori error estimates.**
9. (with S. Le Borne) Rapid error reduction for block Gauss-Seidel based on p-hierarchical bases, *Numerical Linear Algebra with Applications* Vol. 20, No. 5, pp. 743--760 (2013)
10. (with A. Anand and C. Turc) Well-conditioned boundary integral equations for two-dimensional sound-hard scattering problems in domains with corners, *Journal of Integral Equations and Applications*, Vol. 24 No. 3 pp. 1--38 (2012).
11. (with S. Giani and L. Grubišić) Benchmark results for testing adaptive finite element eigenvalue procedures, *Applied Numerical Mathematics* Vol. 62 pp. 121-140 (2012).
12. (with K. Key) A parallel goal-oriented adaptive finite element method for 2.5D electromagnetic modeling, *Geophysical Journal International* Vol. 186 No. 1 pp. 137--154 (2011)
13. (with M. Holst and R. Szypowski) A Robust Error Estimator for Elliptic Problems in R^3, *Applied Numerical Mathematics* Vol. 61 No. 5 pp. 675-695 (2011).
14. (with O. Bruno and C. Turc) A High-Order Integral Algorithm for Highly Singular PDE Solutions in Lipschitz Domains. *Computing*, Vol. 84 Issue 3 (2009), 149-181.
15. (with L. Grubišić) On Estimators for Eigenvalue/Eigenvector Approximations. *Mathematics of Computation*, 78 (2009), 739-770.

16. Hierarchical Matrix Techniques for a Domain Decomposition Algorithm. *Computing*, Vol. 80 Issue 4 (2007), 287-297.
17. (with R.E. Bank) Dual Functions for a Parallel Adaptive Method. *SIAM Journal on Scientific Computing*, Vol. 29 Issue 4 (2007), 1511-1524.
18. Function, Gradient and Hessian Recovery Using Quadratic Edge-Bump Functions. *SIAM Journal on Numerical Analysis*, Vol. 45 Issue 3 (2007), 1064 - 1080.
19. Asymptotically Exact Functional Error Estimators Based on Superconvergent Gradient Recovery. *Numerische Mathematik* 102 (2006), 543-558.
20. An Analysis of GCD and LCM Matrices via the LDL^T Factorization. *Electronic Journal of Linear Algebra* 11 (2004), 51-58.

Proceedings, Technical Reports, Etc.

1. Constructing and Analyzing Non-Standard Error Estimators of Hierarchical Type. Oberwolfach Reports, Vol. 8, No. 2, (2011).
2. Two Dangers to Avoid When Using Gradient Recovery Methods for Finite Element Error Estimation and Adaptivity. Max Planck Technical Report 6/2006, (2006).
3. Hierarchical Matrix Techniques for a Domain Decomposition Algorithm. Proceedings of the International Conference of Numerical Analysis and Applied Mathematics (ICNAAM), 15-19 September, 2006 , Crete, Greece. Wiley-VCH Verlag, (ISBN-10) 3-527-40743-X.
4. Asymptotically Exact Functional Error Estimators on Meshes with Superconvergence. Oberwolfach Reports, Vol. 2, No. 2, 1350--1352 (2005).
5. Duality-Based Adaptive Refinement for Elliptic PDEs. Ph.D. Thesis, University of California at San Diego (2004).

Invited Talks

1. Hierarchical error estimation and adaptive approximation with a view toward marine FEM. 9th Annual Seafloor Electromagnetic Methods Consortium Workshop. La Jolla, California, March 17-19, 2015.
2. On the numerical treatment of elliptic eigenvalue problems. Departmental colloquium, Lewis & Clark College. Portland, Oregon, February 18, 2015.
3. A framework for robust estimation of error in eigenvalue computations for non-self-adjoint operators. Numerical Analysis Seminar, Texas A&M. College Station, Texas, February 4, 2015
4. A framework for robust estimation of error in eigenvalue computations for non-self-adjoint operators. Departmental colloquium, Indian Institute of Technology, Kanpur. November 27, 2014.
5. Finite element error estimation for a Schro◎dinger operator with inverse-square potential. Departmental colloquium, Indian Institute of Technology, Kanpur. November 26, 2014.
6. Auxiliary subspace error estimation for Galerkin (Finite Element) discretizations. Departmental colloquium, Indian Institute of Technology, Kanpur. November 25, 2014.
7. Finite element error estimation for boundary value and eigenvalue problems associated with a Schro◎dinger operator. 11th World Congress on Computational Mechanics (WCCM XI). Barcelona, Spain, July 20-25, 2014.
8. Finite element error estimation for boundary value and eigenvalue problems associated with a Schro◎dinger operator. Oberwolfach workshop: Schnelle Lo◎ser fu◎r partielle Differentialgleichungen. Oberwolfach, Germany, May 12-16, 2014.
9. Finite element error estimation for boundary value and eigenvalue problems associated with a Schrödinger operator. Oregon State University, Department Colloquium, Jan. 13, 2014.
10. A posteriori estimation of hierarchical type for a Schrödinger operator with inverse square potential. SIAM Annual Meeting, San Diego, July 8-12, 2013.
11. Auxiliary subspace error estimation for high-order finite element eigenvalue approximations. The Mathematics of Finite Elements andd Applications (MAFELAP 2013), Brunel, London, June 10-14, 2013.
12. A posteriori estimation of hierarchical type for a Schrödinger operator with inverse square potential. The Mathematics of Finite Elements andd Applications (MAFELAP 2013), Brunel, London, June 10-14, 2013.
13. A posteriori estimation of hierarchical type for the Schrödinger operator with inverse square potential on graded meshes. 4th International Congress on Computational Engineering and Sciences (FEMTEC 2013), Las Vegas, May 19 - 24, 2013.
14. Robust and flexible a posteriore error estimation using auxiliary subspace techniques. University of Pittsburgh, Computational Mathematics Seminar, March 26, 2013.

15. A posteriori estimation of hierarchical type for the Schrödinger operator with inverse square potential on graded meshes. Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications; Joint Mathematics Meetings, San Diego, California, January 9-12, 2013.
16. Robust and flexible a posteriori error estimation using auxiliary subspace techniques. Portland State University, Departmental Colloquium, Jan. 22, 2013.
17. Error estimation and adaptivity for el liptic eigenvalue problems. UCSD Workshop of Finite Element Exterior Calculus and Adaptive Finite Element Methods, January 14-25 (Jan. 15), 2013.
18. A posteriori estimation of hierarchical type for the Schrödinger operator with inverse square potential on graded meshes. Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications; Joint Mathematics Meetings, San Diego, California, January 9-12, 2013.
19. Toward a robust and efficient hp-adaptive method for elliptic eigenvalue problems. Banff (BIRS) Workshop "Eigenvalues/singular values and fast PDE algorithms: acceleration, conditioning, and stability". Banff, Alberta, Canada, June 24-29, 2012.
20. Toward a robust and efficient hp-adaptive method for elliptic eigenvalue problems. 8^{th} International Conference on Scientific Computing and Applications. Las Vegas, Nevada, April 1-4, 2012.
21. A General Approach for Error Estimation and Adaptivity for Elliptic Eigenvalue Problems. Wayne State University, Numerical Analysis Seminar. Detroit, Michigan, February 1, 2012.
22. Flexible Finite Element Error Estimation Using Auxiliary-Subspaces. Wayne State University, Department Colloquium. Detroit, Michigan, January 30, 2011.
23. A Framework for Constructing and Analyzing Hierarchical-Type Error Estimators. 11th US National Congress on Computational Mechanics. Minneapolis, Minnesota, July 24-29, 2011.
24. Constructing and Analyzing Error Estimators of Hierarchical Type. Christian-Albrechts Universitaet zu Kiel. Kiel, Germany, June 17, 2011.
25. Constructing and Analyzing Error Estimators of Hierarchical Type. Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB). Berlin, Germany, June 10, 2011.
26. Constructing and Analyzing Non-Standard Error Estimators of Hierarchical-Type. Oberwolfach workshop "Schnelle Löser für partielle Differentialgleichungen". Oberwolfach, Germany, May 22-28, 2011.
27. A Framework for Robust Error Estimation and Acceleration of Convergence for Elliptic Eigenvalue Problems. AMS Southwest Sectional Meeting. Las Vegas, Nevada, April 30-May 1, 2011.
28. Constructing and Analyzing Non-Standard Error Estimators of Hierarchical-Type. AMS Southwest Sectional Meeting. Las Vegas, Nevada, April 30-May 1, 2011.
29. A Framework for Analyzing and Constructing Hierarchical-Type A Posteriori Error Estimators. Carnegie Mellon University, March 26, 2011.
30. Exploiting the natural block-structure of hierarchically-decomposed variational discretizations of elliptic boundary value problems. SIAM Conference on Computational Science and Engineering. Reno, Nevada, Feb. 28 - Mar 4, 2011.
31. A Framework for Robust Eigenvalue and Eigenvector Error Estimation and Ritz Value Convergence Enhancement. Analysis Seminar, University of Delaware, October 21, 2010.
32. A Robust and Flexible A Posteriori Error Estimate in R^3. Oberseminar Numerik und Wissenschaftliches Rechnen, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany, July 29, 2010.
33. Exploiting the natural block-structure of hierarchically-decomposed variational discretizations of elliptic boundary value problems. 26th International Workshop on Operator Theory and its Applications, Berlin, July 12-16, 2010.
34. A Robust and Flexible A Posteriori Error Estimate for R^3. AMS Sectional Meeting, Lexington, Kentucky, March 27-28, 2010.
35. Reliable Error Estimation and Acceleration of Convergence for Elliptic Eigenvalue Problems. Workshop on Adaptive and Multilevel Methods for Partial Differential Equations. University of California, San Diego, November 13-14, 2009.
36. A Robust Error Estimator for Elliptic Eigenvalue Problems. The Mathematics of Finite Elements and Applications (MAFELAP), Brunel Institute of Computational Mathematics, London, May 2009.
37. A High-Order Boundary Integral Method for Neumann Boundary Value Problems on Lipschitz Domains. Computational and Applied Mathematics Colloquium, University of California, San Diego, December 2008.
38. A Hierarchical Basis Error Estimate Requiring only H1-regularity of the Exact Solution. SIAM Annual Meeting, San Diego, July 2008.
39. Efficient and Reliable Error Estimation for Elliptic Eigenvalue Problems. AMS Sectional Meeting, Bloomington, Indiana, April 2008.

40. Two Improvements of a Parallel Adaptive Algorithm. Purdue University Colloquium, West Lafayette, Indiana, April 2008.
41. Efficient and Reliable Error Estimation for Elliptic Eigenvalue Problems. Computational and Applied Mathematics Colloquium, University of California, San Diego, December 2007.
42. On Estimators for Eigenvalue/Eigenvector Approximations. Fifth Conference on Applied Mathematics and Scientific Computing (ApplMath07), Brijuni Island, Croatia, 7/07.
43. On Estimators for Eigenvalue/Eigenvector Approximations. The 23nd GAMM Seminar, MPI Leipzig GERMANY, 1/07.
44. Improving a Parallel Adaptive Meshing Algorithm Using Dual-Weighted Error Estimates. Institut für Reine und Angewandte Mathematik, RWTH, Aachen, Germany, 11/06.
45. Hierarchical Matrix Techniques for a Domain Decomposition Algorithm. International Conference of Numerical Analysis and Applied Matematics, Crete, Greece, 9/06.
46. Cheap and Reliable Functional Error Estimation and Goal-Oriented Adaptivity. Quasi-continuum Method Group Seminar, University of Minnesota, Minneapolis, 2/06.
47. Function, Gradient and Hessian Recovery Using Quadratic Edge-Bump Functions. University of California, Computational and Applied Mathematics Seminar. San Diego, California, 2/06.
48. Function, Gradient and Hessian Recovery Using Quadratic Edge-Bump Functions. The 22nd GAMM Seminar, MPI Leipzig GERMANY, 1/06.
49. Asymptotically Exact Functional Error Estimators Based on Superconvergent Gradient Recovery. International Workshop on Reliable Methods of Mathematical Modelling, Zurich, 7/05.
50. Asymptotically Exact Functional Error Estimators on Meshes with Superconvergence. Oberwolfach Workshop: Schnelle Löser für partielle Differentialgleichungen, Oberwolfach GERMANY, 5/05.
51. Dual Functions for Parallel Adaptive Algorithms. The 21st GAMM Seminar, MPI Leipzig GERMANY, 1/05.

Contributed Talks

1. A posteriori error estimation for \(H^1\) approximations of non-self-adjoint eigenvalue problems. 2nd Cascade RAIN Meeting. Portland State University, Portland, Oregon, April 4, 2015.
2. Robust estimates for (hp-adaptive) approximations of non-self-adjoint eigenvalue problems. 1st CASCADE Conference. Oregon State University, Corvalis, Oregon, April 5, 2014.
3. A Framework for Analyzing and Constructing Hierarchical-Type A Posteriori Error Estimates. Finite Element Circus (IMA). Minneapolis, Minnesota, November 5-6, 2010.
4. A Framework for Error Estimation and Acceleration of Convergence for Elliptic Eigenvalue Problems. Finite Element Circus, Providence, Rhode Island, April 30-May 1, 2010.
5. A Robust and Flexible A Posteriori Error Estimate in R^3. Finite Element Circus. Knoxville, Tennessee, October 16-17, 2009.
6. Duality Techniques for Parallel Adaptive Finite Element Algorithms. Southern California Applied Mathematics Symposium, 4/04.
