
Invited Talks, Poster Contributions and Publications

- 2016 **Batched Routines in Preconditioning – The Future of Incomplete Factorization Preconditioners**, *Workshop on Batched, Reproducible, and Reduced Precision BLAS, Knoxville.*
- 2016 **ParILUT – A new parallel threshold ILU**, *SIAM Conference on Parallel Processing, SIAM PP 2016, Paris.*
- 2016 **Feeding of the Thousands - Leveraging the GPU's Computing Power for Sparse Linear Algebra**, *SPPEXA annual meeting, Garching.*
- 2016 **Optimizing Relaxation methods for Bit-Flip Resilience**, *University Jaime I.*
- 2015 **Block-Asynchronous Jacobi Iterations with Overlapping Domains**, *SIAM Conference on Linear Algebra, SIAM LA 2015, Atlanta.*
- 2015 **Experiences in Autotuning Linear Algebra Operations for Energy Minimization on GPUs**, *Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg.*
- 2015 **Iterative Incomplete Factorization Preconditioners for Manycore Architectures**, *Application Specific Computing (ASC), University of Heidelberg, Heidelberg.*
- 2015 **Experiences in Autotuning Linear Algebra Operations for Energy Minimization on GPUs**, *SIAM Conference on Computational Science & Engineering, SIAM CSE 2015, Salt Lake City.*
- 2015 **Radical Optimization Techniques for Asynchronous Iterative Algorithms on GPUs**, *SIAM Conference on Computational Science & Engineering, SIAM CSE 2015, Salt Lake City.*
- 2014 **Asynchronous ILU computation on GPUs**, *8th International Workshop on Parallel Matrix Algorithms and Applications, PMAA 2014, Lugano.*
- 2013 **Energy-Efficiency in Scientific Computing**, *Invited Talk at Workshop on Stochastic Modelling and Computing for Weather and Climate Prediction, Oxford Centre for Collaborative Applied Mathematics, University of Oxford.*
- 2013 **Global Young Scientists Summit (GYSS)**, *Singapore.*
- 2012 **Is Unconventional High Performance Computing Solution to the Power Challenge?**, *Keynote Talk at EuroPar 2012 Unconventional High Performance Computing Workshop.*
- 2012 **Energiesparen durch Mathematik**, *Invited Popular Scientific Talk in "Junge Talente".*
- 2012 **Energy-Efficient Numerics**, *PhD-Symposium, Karlsruhe Institute of Technology.*
- 2011 **Mixed Precision Iterative Refinement – Evaluation of Performance and Energy Efficiency in Computational Fluid Dynamics**, *International Conference on Simulation Technology 2011.*
- 2011 **Accelerating COSMO-ART: CPU and GPU opportunities**, *CLM-Community Assembly, Napoli.*
- 2011 **Energy-Aware Numerics - Sparse Linear System Solvers**, *Energy-Symposium: Future of the Energy - Energy of the Future.*

- 2011 **Mixed Precision in Computational Fluid Dynamics – An Error Correcting Approach for Solving Linear Systems**, *Summer School of the "Université Franco-Allemande": Modeling, Simulation and Optimization in Fluid Dynamics*.
- 2010 **Multiscale Ensemble Simulations on HPC Systems – Precipitation Forecast Application**, *CiHPC - Competence in High Performance Computing, Schloss Schwetzingen*.
- 2010 **Mixed Precision in Computational Fluid Dynamics – An Error Correcting Approach for Solving Linear Systems**, *Conference for Young Scientists: Facing the Multicore-Challenge, Heidelberger Akademie der Wissenschaften*.

Peer-reviewed Publications in Chronological Order

H. Anzt, V. Heuveline, and B. Rucker. Mixed precision error correction methods for linear systems Convergence analysis based on Krylov subspace methods. In K. Jonasson, editor, *PARA 2010, Part II, LNCS 7134*, pages 237–248. Springer, Heidelberg, 2010.

H. Anzt, V. Heuveline, and B. Rucker. Mixed Precision Iterative Refinement Methods for Linear Systems: Convergence Analysis Based on Krylov Subspace Methods. In *PARA (2)*, volume 7134 of *Lecture Notes in Computer Science*, pages 237–247. Springer, 2010.

H. Anzt, B. Rucker, and V. Heuveline. Energy efficiency of mixed precision iterative refinement methods using hybrid hardware platforms - An evaluation of different solver and hardware configurations. *Computer Science - Research and Development*, 25(3-4):141–148, 2010.

H. Anzt, W. Augustin, M. Baumann, T. Gengenbach, T. Hahn, A. Helfrich-Schkarbanenko, V. Heuveline, E. Ketelaer, D. Lukarski, A. Nestler, S. Ritterbusch, S. Ronnas, M. Schick, M. Schmidtobreich, C. Subramanian, J.-P. Weiss, F. Wilhelm, and M. Wlotzka. Hiflow³: A hardware-aware parallel finite element package. In *Tools for High Performance Computing 2011 - Proceedings of the 5th International Workshop on Parallel Tools for High Performance Computing, ZIH, Dresden, September 2011*, pages 139–151, 2011.

H. Anzt, W. Augustin, M. Baumann, T. Gengenbach, T. Hahn, A. Helfrich-Schkarbanenko, V. Heuveline, E. Ketelaer, D. Lukarski, A. Nestler, S. Ritterbusch, S. Ronnas, M. Schick, M. Schmidtobreich, C. Subramanian, J.-P. Weiss, F. Wilhelm, and M. Wlotzka. HiFlow3: A Hardware-Aware Parallel Finite Element Package. In *Parallel Tools Workshop*, pages 139–151. Springer, 2011.

H. Anzt, V. Heuveline, J. I. Aliaga, M. Castillo, J. C. Fernandez, R. Mayo, and E. S. Quintana-Orti. Analysis and optimization of power consumption in the iterative solution of sparse linear systems on multi-core and many-core platforms. In *Green Computing Conference and Workshops (IGCC), 2011 International*, pages 1–6, july 2011.

H. Anzt, V. Heuveline, and B. Rucker. An Error Correction Solver for Linear Systems: Evaluation of Mixed Precision Implementations. In José Palma, Michel Daydé, Osni Marques, and Joao Lopes, editors, *High Performance Computing for Computational Science – VECPAR 2010*, volume 6449 of *Lecture Notes in Computer Science*, pages 58–70. Springer Berlin / Heidelberg, 2011.

H. Anzt, V. Heuveline, B. Rucker, M. Castillo, J. C. Fernández, R. Mayo, and E. S. Quintana-Ortí. Power Consumption of Mixed Precision in the Iterative Solution of Sparse Linear Systems. In *IPDPS Workshops*, pages 829–836, 2011.

H. Anzt. *Asynchronous and Multiprecision Linear Solvers - Scalable and Fault-Tolerant Numerics for Energy Efficient High Performance Computing*. PhD thesis, Karlsruhe Institute of Technology, Institute for Applied and Numerical Mathematics, Nov. 2012.

H. Anzt, M. Castillo, J. C. Fernández, V. Heuveline, F. D. Igual, R. Mayo, and E. S. Quintana-Ortí. Optimization of power consumption in the iterative solution of sparse linear systems on graphics processors. *Computer Science - R&D*, 27(4):299–307, 2012.

H. Anzt, P. Luszczek, J. Dongarra, and V. Heuveline. GPU-Accelerated Asynchronous Error Correction for Mixed Precision Iterative Refinement. In *Lecture Notes in Computer Science*, volume 7484, pages 908–919. Springer Berlin Heidelberg, 2012.

H. Anzt, S. Tomov, J. Dongarra, and V. Heuveline. A Block-Asynchronous Relaxation Method for Graphics Processing Units. In *IPDPS Workshops*, pages 113–124. IEEE Computer Society, 2012.

H. Anzt, S. Tomov, J. Dongarra, and V. Heuveline. Weighted Block-Asynchronous Iteration on GPU-Accelerated Systems. In *Euro-Par Workshops*, volume 7640 of *Lecture Notes in Computer Science*, pages 145–154. Springer, 2012.

H. Anzt, S. Tomov, M. Gates, J. Dongarra, and V. Heuveline. Block-asynchronous Multigrid Smoothers for GPU-accelerated Systems. In Hesham H. Ali, Yong Shi, Deepak Khazanchi, Michael Lees, G. Dick van Albada, Jack Dongarra, and Peter M. A. Sloot, editors, *ICCS*, volume 9 of *Procedia Computer Science*, pages 7–16. Elsevier, 2012.

J.I. Aliaga, J. Perez, E.S. Quintana-Orti, and H. Anzt. Reformulated Conjugate Gradient for the Energy-Aware Solution of Linear Systems on GPUs. In *Parallel Processing (ICPP), 2013 42nd International Conference on*, pages 320–329, Oct 2013.

H. Anzt, S. Tomov, J. Dongarra, and V. Heuveline. A block-asynchronous relaxation method for graphics processing units. *J. Parallel Distrib. Comput.*, 73(12):1613–1626, 2013.

J. I. Aliaga, H. Anzt, M. Castillo, J. Fernández, G. Leó, J. Perez, and E. S. Quintana-Ortí. Performance and Energy Analysis of the Iterative Solution of Sparse Linear

Systems on Multicore and Manycore Architectures. In *Lecture Notes in Computer Science*, volume 8384, 2014.

H. Anzt, A. Beglarian, S. Chilingaryan, A. Ferrone, V. Heuveline, and A. Kopmann. A unified energy footprint for simulation software. *Computer Science - Research and Development*, 29(2):131–138, 2014.

H. Anzt, D. Lukarski, S. Tomov, and J. Dongarra. Self-Adaptive Multiprecision Preconditioners on Multicore and Manycore Architectures. In *11th International Meeting on High Performance Computing for Computational Science, VECPAR 2014*, 2014.

H. Anzt and E. S. Quintana-Ortí. Improving the energy efficiency of sparse linear system solvers on multicore and manycore systems. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 372(2018), 2014.

H. Anzt, W. Sawyer, S. Tomov, P. Luszczek, I. Yamazaki, and J. Dongarra. Optimizing Krylov Subspace Solvers on Graphics Processing Units. In *28th IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW 2014)*, 2014.

H. Anzt, S. Tomov, and J. Dongarra. Implementing a Sparse Matrix Vector Product for the SELL-C/SELL-C- σ formats on NVIDIA GPUs. In *Technical Report*, 2014.

D. Lukarski, H. Anzt, S. Tomov, and J. Dongarra. Hybrid Multi-Elimination ILU Preconditioners on GPUs. In *28th IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW 2014)*, 2014.

I. Yamazaki, H. Anzt, S. Tomov, M. Hoemmen, and J. Dongarra. Improving the Performance of CA-GMRES on Multicores with Multiple GPUs. In *28th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2014)*, 2014.

J. I. Aliaga, H. Anzt, M. Castillo, J. C. Fernández, G. León, J. Pérez, and E. S. Quintana-Ortí. Unveiling the performance-energy trade-off in iterative linear system solvers for multithreaded processors. *Concurrency and Computation: Practice and Experience*, 27(4):885–904, 2015.

H. Anzt, E. Chow, and J. Dongarra. Iterative sparse triangular solves for preconditioning. In Jesper Larsson Träff, Sascha Hunold, and Francesco Versaci, editors, *Euro-Par 2015: Parallel Processing*, volume 9233 of *Lecture Notes in Computer Science*, pages 650–661. Springer Berlin Heidelberg, 2015.

H. Anzt, J. Dongarra, and E. S. Quintana-Ortí. Adaptive Precision Solvers for Sparse Linear Systems. In *Proceedings of the 3rd International Workshop on Energy Efficient Supercomputing, E2SC '15*, pages 2:1–2:10, New York, NY, USA, 2015. ACM.

H. Anzt, J. Dongarra, and E. S. Quintana-Ortí. Tuning Stationary Iterative Solvers for Fault Resilience. In *Proceedings of the 6th Workshop on Latest Advances in*

Scalable Algorithms for Large-Scale Systems, ScalA '15, pages 1:1–1:8, New York, NY, USA, 2015. ACM.

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H. Anzt, W. Sawyer, S. Tomov, P. Luszczek, and J. Dongarra. Acceleration of GPU-based Krylov solvers via Data Transfer Reduction. *International Journal of High Performance Computing*, 2015.

H. Anzt, S. Tomov, and J. Dongarra. Accelerating the LOBPCG method on GPUs using a blocked Sparse Matrix Vector Product. In *Spring Simulation Multi-Conference 2015 (SpringSim'15)*, 2015.

H. Anzt, S. Tomov, and J. Dongarra. Energy Efficiency and Performance Frontiers for Sparse Computations on GPU Supercomputers. In *Proceedings of the Sixth International Workshop on Programming Models and Applications for Multicores and Manycores*, PMAM '15, pages 1–10, New York, NY, USA, 2015. ACM.

E. Chow, H. Anzt, and J. Dongarra. Asynchronous Iterative Algorithm for Computing Incomplete Factorizations on GPUs. In *Lecture Notes in Computer Science*, volume 9137, pages 1–16, July 12 – 16 2015.

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A. Abdelfattah, H. Anzt, J. Dongarra, M. Gates, A. Haidar, J. Kurzak, P. Luszczek, S. Tomov, I. Yamazaki, and A. YarKhan. Linear algebra software for large-scale accelerated multicore computing. *Acta Numerica*, 25:1–160, 5 2016.

H. Anzt, M. Baboulin, J. Dongarra, F. Fournier, Y. Hulsemann, A. Khabou, and Y. Wang. Accelerating the Conjugate Gradient Algorithm with GPU in CFD Simulations. *VECPAR*, 2016.

H. Anzt, E. Chow, J. Saak, and J. Dongarra. Updating Incomplete Factorization Preconditioners for Model Order Reduction. *Numerical Algorithms*, 2016.

H. Anzt, E. Chow, D.B. Szyld, and J. Dongarra. Domain Overlap for Iterative Sparse Triangular Solves on GPUs. In Hans-Joachim Bungartz, Philipp Neumann, and Wolfgang E. Nagel, editors, *Software for Exascale Computing - SPPEXA*, volume 113 of *Lecture Notes in Computer Science and Engineering*, pages 527–545. Springer International Publishing, 2016.

H. Anzt, J. Dongarra, M. Kreutzer, G. Wellein, and M. Koehler. Efficiency of general krylov methods on gpus – an experimental study. In *2016 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pages 683–691, May 2016.

H. Anzt, M. Kreutzer, E. Ponce, G. D. Peterson, G. Wellein, and J. Dongarra. Optimization and performance evaluation of the IDR iterative Krylov solver on GPUs. *International Journal of High Performance Computing*, doi: 10.1177/1094342016646844, 2016.

H. Anzt, S. Tomov, and J. Dongarra. On the performance and energy efficiency of sparse linear algebra on GPUs. *International Journal of High Performance Computing Applications*, 2016.

H. Anzt, E. Chow, T. Huckle, and J. Dongarra. Batched Generation of Incomplete Sparse Approximate Inverses on GPUs. *Workshop on Latest Advances in Scalable Algorithms for Large-Scale Systems (ScaLA 2016)*, 2016, accepted.

Hartwig Anzt, Edmond Chow, and J. Dongarra. ParLLUT - A new Parallel Threshold ILU Factorization. *SIAM Journal on Scientific Computing*, submitted.

Hartwig Anzt, Thomas Huckle, Jürgen Bräckle, and Jack Dongarra. Incomplete Sparse Approximate Inverses for Parallel Preconditioning. *SIAM Journal on Scientific Computing*, submitted.