Hartwig Anzt

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Summary

Hartwig Anzt is the Chair of Computational Mathematics at the TUM School of Computation, Information and Technology of the Technical University of Munich (TUM) Campus Heilbronn. He also holds a Research Associate Professor position at the Innovative Computing Lab (ICL) at the University of Tennessee (UTK). Hartwig Anzt holds a PhD in applied mathematics from the Karlsruhe Institute of Technology (KIT) and specializes in iterative methods and preconditioning techniques for the next generation hardware architectures. He also has a long track record of high-quality development. He is the author of the MAGMA-sparse open-source software package and the managing lead of the Ginkgo math software library. Hartwig Anzt had served as a PI in the Software Technology (ST) pillar of the US Exascale Computing Project (ECP), including a coordinated effort aiming at integrating low-precision functionality into high-accuracy simulation codes. He also is a PI in the EuroHPC project MICROCARD. Hartwig Anzt serves as Editor for ACM TOPC and SIAM SISC. He also is elected program manager of the SIAM Activity Group on Supercomputing.

Professional Background

January 2024 – now	**Full Professor**, *Technical University Munich*.
January 2024 – now	**Adjunct Professor**, *University of Tennessee*.
August 2022 – December 2023	**Director of the Innovative Computing Lab (ICL)**, *University of Tennessee*.
August 2022 – 2023	**Associate Professor in the Electrical Engineering and Computer Science Department (EECS)**, *University of Tennessee*.
August 2022 – 2023	**Senior Scientist**, *Karlsruhe Institute of Technology*.
Nov 2021 – July 2022	**Juniorprofessor in the Department for Informatics**, *Karlsruhe Institute of Technology*.
May 2017 – July 2022	**Helmholtz Young Investigator Group Leader**, *Karlsruhe Institute of Technology*. Steinbuch Centre for Comuting (SCC)
May 2018 – July 2022	**KIT Associate Fellow**, *Karlsruhe Institute of Technology*, Karlsruhe.
May 2017 – July 2022	**Research Consultant**, *University of Tennessee*, Knoxville. Innovative Computing Lab (ICL)
June 2015 – May2017	**Research Scientist**, *University of Tennessee*, Knoxville. Innovative Computing Lab (ICL)
June 2013 – May 2015	**PostDoctoral Researcher**, *University of Tennessee*, Knoxville. Innovative Computing Lab (ICL)
March 2010 – May 2013	**Research Associate**, *Karlsruhe Institute of Technology*, Karlsruhe. Institute for Applied and Numerical Mathematics

Hartwig Anzt

Curriculum Vitae

Academic Background

2024 **Full Professor in CIT**, *Technical University of Munich*.

2022 **Associate Professor in EECS**, *University of Tennessee*.

2021 **Junior Professor in Informatics**, *Karlsruhe Institute of Technology*.

2020 **Evaluation of the Helmholtz Young Investigator Group**, *Successful completion of the evaluation (with distinction)*, Tenured on Research Group Lead Position.

2020 **Completion of the KIT Academic Leadership Certificate**, *(204 academic units of leadership training)*.

2017–now **Helmholtz Young Investigator Group Lead**, *Karlsruhe Institute of Technology*, Algorithm Engineering for Exascale.

2013–2015 **PostDoctoral Researcher**, *University of Tennessee*, Numerical Linear Algebra.

Nov. 2012 **PhD, Mathematics**, *Asynchronous and Multiprecision Linear Solvers*, Prof. Dr. Vincent Heuveline, Prof. Dr. Jack Dongarra, Prof. Dr. Rudolf Lohner.

2010–2012 **PhD Student**, *Karlsruhe Institute of Technology*, Mathematics.

Dec. 2009 **Dipl. Math.-techn.**, *Hybrid Parallel Solvers for Computational Fluid Dynamics*, Prof. Dr. Vincent Heuveline, Jun.-Prof. Dr. Jan-Philipp Weiss.

2008–2009 **Graduate Student**, *University of Karlsruhe*, Mathematics, Physics, Computer Science.

2007–2008 **Graduate Student**, *University of Ottawa, CA*, Mathematics, Computer Science.

June 2006 **Prediploma**, *University of Karlsruhe*.

2004–2006 **Student**, *University of Karlsruhe*, Mathematics, Physics, Computer Science.

1995–2004 **Abitur**, *Otto-Hahn-Gymnasium Karlsruhe*, Graduated with distinction, Grade: 1.0.

Third Party Funding

2025 **PI in EuroHPC Center of Excellence**, *Numerical modeling of cardiac electrophysiology at the cellular scale – MICROCARD 2*, **€0.7M to Hartwig Anzt's research group at the TU Munich**.
Funded by the European Comission

2023 **PI in DOE SciDAC Project on Plasma Fusion Research**, *Multi–Fidelity Plasma Fusion Research*, **US$.3M to Hartwig Anzt's research group at the University of Tennessee**.
Funded by US Department of Energy (DoE)

2023 **PI of Intel OneAPI Center of Excellence**, *US$.1M/year to Hartwig Anzt's research group at the University of Tennessee*, Industry collaboration project funded by the Intel Corporation.

2022 **PI of Intel OneAPI Center of Excellence**, *US$.1M/year to Hartwig Anzt's research group at the University of Tennessee*, Industry collaboration project funded by the Intel Corporation.

2022 **Incoming PI in subproject of US Exascale Computing Project**, *Exa-PAPI*, **US$4.7M to Hartwig Anzt's research group at the University of Tennessee**.
Funded by US Department of Energy (DoE)

2022 **Incoming PI in subproject of US Exascale Computing Project**, *CLOVER*, **US$8.6M to Hartwig Anzt's research group at the University of Tennessee**.
Funded by US Department of Energy (DoE)

2022 **Co-PI in BMBF Project**, *PDExa*, Total volume €1,5M, **€.25M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the German BMBF

2022 **Co-PI in BMBF Project**, *ExaSim*, Total volume €1.5M, **€.7M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the German BMBF

2022 **Co-PI in BMBF Project**, *WarmWorld*, Total volume €4.5M, **€1.2M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the German BMBF

2021 **PI of Intel OneAPI Center of Excellence**, *US$.1M/year at the University of Tennessee*, Industry collaboration project funded by the Intel Corporation.

2021 **PI in subproject of US Exascale Computing Project**, *GPU-resident sparse direct solvers*, Total volume US$1.2M, **US$.4M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by US Department of Energy (DoE)

2021 **Co-PI in subproject of US Exascale Computing Project**, *xSDK Batched Kernels*, Total volume US$1.3M, **US$.15M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by US Department of Energy (DoE)

2021 **PI in Fair-RS project on deploying a sustainable research software infrastructure**, Total volume €.5M, **€.4M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the digitalization fund of the Karlsruhe Institute of Technology

2021 **Co-PI in Germany's High Performance Computing Initiative (NHR)**, Karlsruhe Institute of Technology.
Funded by the State of Baden-Wuerttemberg and the German Federal Government

2021 **PI in EuroHPC project**, *Numerical modeling of cardiac electrophysiology at the cellular scale – MICROCARD*, Total volume €5.8M, **€0.7M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the European Comission

2019 **PI in subproject of US Exascale Computing Project**, *xSDK Multiprecision effort of the US Exascale Computing Project*, Total volume US$3M, **US$1.5M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by US Department of Energy (DoE)

2021 **PI in KIT Information Technology Project**, *Numerical Libraries accelerating Computational Science*, Total volume €.14M, **US$.14M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.
Funded by the Information Technology fund of the Karlsruhe Institute of Technology

2017 **PI in Helmholtz Young Investigator Group (HYIG)**, *Fixed-Point Methods for Numerics at Exascale (FiNE)*, (Total volume **€1.5M to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**, Helmholtz Foundation, Karlsruhe Institute of Technology (KIT).

2020 **PI in KIT Young Investigator Project**, *OpenCarp Accelerate*, Total volume €80K, **€40K to Hartwig Anzt's research group at the Karlsruhe Institute of Technology**.

Total volume of personalized third party funding in the last 7 years: $\sim$ €7M.

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Curriculum Vitae

Research Focus

- Algorithm engineering for computational mathematics, in particular numerical liner algebra.
- Design of algorithms for extreme parallelism and GPU computing.
- Mixed precision and adaptive precision methods.
- Asynchronous and communication-avoiding algorithms.
- Sustainable software engineering.
- Production-ready math libraries.
  - Ginkgo library: `https://ginkgo-project.github.io/`
  - MAGMA-sparse library: `http://icl.cs.utk.edu/magma/`

Professional Activities

Recent Community Event Organization

- General Chair: **SIAM Conference on Parallel Processing 2026** `https://www.siam.org/conferences/cm/conference/pp26`
- Organizing Committee: **SIAM Conference on Parallel Processing 2024** `https://www.siam.org/conferences/cm/conference/pp24`
- Workshop Chair: **HeteroPar Conference 2023** `https://icl.utk.edu/workshops/heteropar2023/index.html`
- Associate Editor: **SIAM Journal on Scientific Computing (SISC) 2022-2024** `https://www.siam.org/publications/journals/siam-journal-on-scientific-computing-sisc`
- Associate Editor: **ACM Transactions on Parallel Computing (TOPC) 2022-25** `https://dl.acm.org/journal/topc`
- Workshop chair: **ISC High Performance 2022** `https://www.isc-hpc.com/`
- Workshop deputy chair: **ISC High Performance 2021** `https://www.isc-hpc.com/`
- Workshop deputy chair: **ISC High Performance 2020** `https://www.isc-hpc.com/`
- Tutorial organizer: **Modern Mixed and Multiprecision Methods**
  at International Conference on Supercomputing, ISC 2021, Frankfurt
- Session organizer: **Multiprecision Numerics in Scientific High Performance Computing**
  at Platform for Advanced Scientific Computing, PASC 2021, Geneva
- Session organizer: **Multiprecision Numerics in Scientific High Performance Computing**
  at Siam Conference on Linear Algebra, SIAM LA 2021, New Orleans
- Workshop co-chair: **ISC High Performance 2021**, **ISC High Performance 2021**
- Workshop co-chair: **ISC High Performance 2020**, **ISC High Performance 2020**
- Workshop organizer: **Workshop on Scalable Data Analytics in Scientific Computing (SDASC)** at ISC High Performance 2019
- Session organizer: **Scientific Computing** at GAMM 2019

Program Committee
- ISC High Performance (ISC)
- International Parallel and Distributed Processing Symposium (IPDPS)
- Platform for Advanced Scientific Computing (PASC)
- International Workshop on Parallel Matrix Algorithms and Applications (PMAA)
- International Conference on Computational Science (ICCS)
- Workshop on Latest Advances in Scalable Algorithms for Large-Scale Systems (ScaLA)
- International European Conference on Parallel and Distributed Computing (EuroPar)

Journal Reviews
- PLOS One
- SIAM Journal on Scientific Computing (SISC)
- Transactions on Parallel and Distributed Systems (TPDS)
- Parallel Computing (ParCO)
- Journal of Parallel and Distributed Computing (JPDC)
- International Journal of High Performance Computing and Applications (IJHPCA)
- Transactions on Mathematical Software (ACM TOMS)
- Concurrency and Computation: Practice and Experience (CCPE)
- Computer Physics Communications (CPC)
- Numerical Algorithms
- Journal of Computational Science (JoCS)

Teaching Experience

2025 **Computational Mathematics 1 - Linear Algebra**, *INHN0009*, TU Munich.

2024 **Computational Mathematics 2 - Analysis**, *INHN0014*, TU Munich.

2024 **Computational Mathematics 1 - Linear Algebra**, *INHN0009*, TU Munich.

2023 **Scientific Computing for Engineers**, *COSC594*, University of Tennessee.

2022 **Numerical Linear Algebra for Scientific High Performance Computing**, *LV 24001380 + 2400140*, Karlsruhe Institute of Technology.

2021 **Numerical Linear Algebra for Scientific High Performance Computing**, *LV 0110650*, Karlsruhe Institute of Technology.

2020 **Numerical Linear Algebra for Scientific High Performance Computing**, *LV 0110650*, Karlsruhe Institute of Technology.

2019 **Scientific Computing for Engineers**, *Invited Lecture in COSC 594 - 005*, University of Tennessee, Knoxville.

2019 **Sustainable Software Development in an Academic Setting**, *Tutorial at 4th International Symposium on Research and Education of Computational Science (RECS)*, University of Tokyo, Japan.

2019 **Selected Topics in Parallel Computing**, *Seminar*, Karlsruhe Institute of Technology.

2019 **Numerical Linear Algebra meets Machine Learning**, *Software Engineering Practice (PSE)*, Karlsruhe Institute of Technology.

2018 **Efficient numerical simulation on multi- and manycore processors**, *Invited Lecture*, Friedrich-Alexander University of Erlangen-Nuremberg.

2018 **Selected Topics in Parallel Computing**, *Seminar*, Karlsruhe Institute of Technology.

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Curriculum Vitae

Scientific Metrics

Citations **3160**, *(Google Scholar, June 2025)*.
h-index **32**, *(Google Scholar, June 2025)*.
i10-index **83**, *(Google Scholar, June 2025)*.

Key Publications

[1] Hartwig Anzt, Axel Huebl, and Xiaoye S Li. Then and now: improving software portability, productivity, and 100× performance. *Computing in Science & Engineering*, 2024.

[2] Terry Cojean, Pratik Nayak, Tobias Ribizel, Natalie Beams, Yu-Hsiang Mike Tsai, Marcel Koch, Fritz Göbel, Thomas Grützmacher, and Hartwig Anzt. Ginkgo-a math library designed to accelerate exascale computing project science applications. *The International Journal of High Performance Computing Applications*, 38(6):568–584, 2024.

[3] Hartwig Anzt, Terry Cojean, Goran Flegar, Fritz Göbel, Thomas Grützmacher, Pratik Nayak, Tobias Ribizel, Yuhsiang Mike Tsai, and Enrique S Quintana-Ortí. Ginkgo: A modern linear operator algebra framework for high performance computing. *ACM Transactions on Mathematical Software (TOMS)*, 48(1):1–33, 2022.

[4] Ahmad Abdelfattah, Hartwig Anzt, Erik G Boman, Erin Carson, Terry Cojean, Jack Dongarra, Alyson Fox, Mark Gates, Nicholas J Higham, Xiaoye S Li, et al. A survey of numerical linear algebra methods utilizing mixed-precision arithmetic. *The International Journal of High Performance Computing Applications*, 35(4):344–369, 2021.

[5] Hartwig Anzt, Edmond Chow, and Jack Dongarra. Parilut—a new parallel threshold ilu factorization. *SIAM Journal on Scientific Computing*, 40(4):C503–C519, 2018.

Peer-Reviewed Publications

Journal Papers

[6] GPUS JOSE I ALIAGA, HARTWIG ANZT, THOMAS GR UTZMACHER, and ENRIQUE S QUINTANA-ORT. Compressed basis gmres on high performance gpus.

[7] Franck Cappello, Mario Acosta, Emmanuel Agullo, Hartwig Anzt, Jon Calhoun, Sheng Di, Luc Giraud, Thomas Grützmacher, Sian Jin, Kentaro Sano, et al. Multifacets of lossy compression for scientific data in the joint-laboratory of extreme scale computing. *Future Generation Computer Systems*, 163:107323, 2025.

[8] Jan Wilhelm Gärtner, Gregor Olenik, Mohammed Elwardi Fadeli, Lukas Petermann, Andreas Kronenburg, Holger Marschall, and Hartwig Anzt. Testing strategies for openfoam projects. *OpenFOAM® Journal*, 5:115–130, 2025.

[9] HARTWIG ANZT. Transforming science through software: Improving while delivering 100x. *Computing in Science & Engineering*, 2024.

[10] Hartwig Anzt, Axel Huebl, and Xiaoye S Li. Then and now: improving software portability, productivity, and 100× performance. *Computing in Science & Engineering*, 2024.

[11] Terry Cojean, Pratik Nayak, Tobias Ribizel, Natalie Beams, Yu-Hsiang Mike Tsai, Marcel Koch, Fritz Göbel, Thomas Grützmacher, and Hartwig Anzt. Ginkgo-a math library designed to accelerate exascale computing project science applications. *The International Journal of High Performance Computing Applications*, 38(6):568–584, 2024.

[12] Piotr Luszczek, Ahmad Abdelfattah, Hartwig Anzt, Atsushi Suzuki, and Stanimire Tomov. Batched sparse and mixed-precision linear algebra interface for efficient use of gpu hardware accelerators in scientific applications. *Future Generation Computer Systems*, 160:359–374, 2024.

[13] Pratik Nayak, Isha Aggarwal, and Hartwig Anzt. Efficient solution of batched band linear systems on gpus. *The International Journal of High Performance Computing Applications*, page 10943420251347460, 2024.

[14] Gregor Olenik, Marcel Koch, Ziad Boutanios, and Hartwig Anzt. Towards a platform-portable linear algebra backend for openfoam. *Meccanica*, pages 1–14, 2024.

[15] Bjorn Stevens, Stefan Adami, Tariq Ali, Hartwig Anzt, Zafer Aslan, Sabine Attinger, Jaana Bäck, Johanna Baehr, Peter Bauer, Natacha Bernier, et al. Earth virtualization engines (eve). *Earth System Science Data*, 16(4):2113–2122, 2024.

[16] Kasia Świrydowicz, Nicholson Koukpaizan, Tobias Ribizel, Fritz Göbel, Shrirang Abhyankar, Hartwig Anzt, and Slaven Peleš. Gpu-resident sparse direct linear solvers for alternating current optimal power flow analysis. *International Journal of Electrical Power & Energy Systems*, 155:109517, 2024.

[17] José I Aliaga, Hartwig Anzt, Thomas Grützmacher, Enrique S Quintana-Ortí, and Andrés E Tomás. Compressed basis GMRES on high-performance graphics processing units. *The International Journal of High Performance Computing Applications*, 0(0):10943420221115140, 2023.

[18] José I Aliaga, Hartwig Anzt, Enrique S Quintana-Ortí, and Andrés E Tomás. Sparse matrix-vector and matrix-multivector products for the truncated svd on graphics processors. *Concurrency and Computation: Practice and Experience*, page e7871, 2023.

[19] Thomas Grützmacher, Hartwig Anzt, and Enrique S Quintana-Ortí. Using Ginkgo's memory accessor for improving the accuracy of memory-bound low precision BLAS. *Software: Practice and Experience*, 53(1):81–98, 2023.

[20] Thomas Grützmacher, Hartwig Anzt, and Enrique S. Quintana-Ortí. Using ginkgo's memory accessor for improving the accuracy of memory-bound low precision blas. *Software: Practice and Experience*, 53(1):81–98, 2023.

[21] Aditya Kashi, Pratik Nayak, Dhruva Kulkarni, Aaron Scheinberg, Paul Lin, and Hartwig Anzt. Integrating batched sparse iterative solvers for the collision operator in fusion plasma simulations on gpus. *Journal of Parallel and Distributed Computing*, 178:69–81, 2023.

[22] Andrés E. Tomás, Enrique S. Quintana-Orti, and Hartwig Anzt. Fast truncated svd of sparse and dense matrices on graphics processors. *The International Journal of High Performance Computing Applications*, 37(3-4):380–393, 2023.

[23] Yu-Hsiang M Tsai, Terry Cojean, and Hartwig Anzt. Providing performance portable numerics for Intel GPUs. *Concurrency and Computation: Practice and Experience*, 35(20):e7400, 2023.

[24] Yu-Hsiang Mike Tsai, Natalie Beams, and Hartwig Anzt. Three-precision algebraic multigrid on gpus. *Future Generation Computer Systems*, 149:280–293, 2023.

[25] Emmanuel Agullo, Mirco Altenbernd, Hartwig Anzt, Leonardo Bautista-Gomez, Tommaso Benacchio, Luca Bonaventura, Hans-Joachim Bungartz, Sanjay Chatterjee, Florina M Ciorba, Nathan DeBardeleben, et al. Resiliency in numerical algorithm design for extreme scale simulations. *The International Journal of High Performance Computing Applications*, 36(2):251–285, 2022.

[26] José I Aliaga, Hartwig Anzt, Thomas Grützmacher, Enrique S Quintana-Ortí, and Andrés E Tomás. Compression and load balancing for efficient sparse matrix-vector product on multicore processors and graphics processing units. *Concurrency and Computation: Practice and Experience*, page e6515, 2022.

[27] Hartwig Anzt, Marc Casas, A Cristiano I Malossi, Enrique S Quintana-Ortí, Florian Scheidegger, and Sicong Zhuang. Approximate computing for scientific applications. *Approximate Computing Techniques*, pages 415–465, 2022.

[28] Hartwig Anzt, Terry Cojean, Goran Flegar, Fritz Göbel, Thomas Grützmacher, Pratik Nayak, Tobias Ribizel, Yuhsiang Mike Tsai, and Enrique S. Quintana-Ortí. Ginkgo: A modern linear operator algebra framework for high performance computing. *ACM Trans. Math. Softw.*, 48(1), 2022.

[29] Terry Cojean, Yu-Hsiang Mike Tsai, and Hartwig Anzt. Ginkgo—a math library designed for platform portability. *Parallel Computing*, 111:102902, 2022.

[30] Neil P Chue Hong, Daniel S Katz, Michelle Barker, Anna-Lena Lamprecht, Carlos Martinez, Fotis E Psomopoulos, Jen Harrow, Leyla Jael Castro, Morane Gruenpeter, Paula Andrea Martinez, et al. Fair principles for research software (fair4rs principles). 2022.

[31] Ahmad Abdelfattah, Hartwig Anzt, Erik G Boman, Erin Carson, Terry Cojean, Jack Dongarra, Alyson Fox, Mark Gates, Nicholas J Higham, Xiaoye S Li, et al. A survey of numerical linear algebra methods utilizing mixed-precision arithmetic. *The International Journal of High Performance Computing Applications*, 35(4):344–369, 2021.

[32] Hartwig Anzt, Eileen Kuehn, and Goran Flegar. Crediting pull requests to open source research software as an academic contribution. *Journal of Computational Science*, 49:101278, 2021.

[33] Neil P Chue Hong, DS Katz, M Barker, AL Lamprecht, C Martinez, FE Psomopoulos, J Harrow, LJ Castro, M Gruenpeter, PA Martinez, et al. Fair principles for research software (fair4rs principles), research data alliance. *URL https://doi. org/10.15497/RDA00065*, 2021.

[34] Goran Flegar, Hartwig Anzt, Terry Cojean, and Enrique S Quintana-Ortí. Adaptive precision block-jacobi for high performance preconditioning in the ginkgo linear algebra software. *ACM Transactions on Mathematical Software (TOMS)*, 47(2):1–28, 2021.

[35] Pratik Nayak, Terry Cojean, and Hartwig Anzt. Evaluating asynchronous schwarz solvers on GPUs. *The International Journal of High Performance Computing Applications*, 35(3):226–236, 2021.

[36] Hartwig Anzt, Terry Cojean, Chen Yen-Chen, Jack Dongarra, Goran Flegar, Pratik Nayak, Stanimire Tomov, Yuhsiang M. Tsai, and Weichung Wang. Load-Balancing Sparse Matrix Vector Product Kernels on GPUs. *ACM Trans. Parallel Comput.*, 7(1), March 2020.

[37] Hartwig Anzt, Erik Boman, Rob Falgout, Pieter Ghysels, Michael Heroux, Xiaoye Li, Lois Curfman McInnes, Richard Tran Mills, Sivasankaran Rajamanickam, Karl Rupp, Barry Smith, Ichitaro Yamazaki, and Ulrike Meier Yang. Preparing sparse solvers for exascale computing. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 378(2166):20190053, 2020.

[38] Hartwig Anzt, Terry Cojean, Yen-Chen Chen, Goran Flegar, Fritz Göbel, Thomas Grützmacher, Pratik Nayak, Tobias Ribizel, and Yu-Hsiang Tsai. Ginkgo: A high performance numerical linear algebra library. *Journal of Open Source Software*, 5(52):2260, 2020.

[39] Thomas Grützmacher, Terry Cojean, Goran Flegar, Hartwig Anzt, and Enrique S Quintana-Ortí. Acceleration of pagerank with customized precision based on mantissa segmentation. *ACM Transactions on Parallel Computing (TOPC)*, 7(1):1–19, 2020.

[40] Thomas Grützmacher, Terry Cojean, Goran Flegar, Fritz Göbel, and Hartwig Anzt. A customized precision format based on mantissa segmentation for accelerating sparse linear algebra. *Concurrency and Computation: Practice and Experience*, 32(15):e5418, 2020.

[41] Tobias Ribizel and Hartwig Anzt. Parallel selection on GPUs. *Parallel Computing*, 91:102588, 2020.

[42] Hartwig Anzt, Terry Cojean, and Eileen Kühn. Towards a new peer review concept for scientific computing ensuring technical quality, software sustainability, and result reproducibility. *PAMM*, 19(1), 2019.

[43] Hartwig Anzt, Jack Dongarra, Goran Flegar, Nicholas J Higham, and Enrique S Quintana-Ortí. Adaptive precision in block-jacobi preconditioning for iterative sparse linear system solvers. *Concurrency and Computation: Practice and Experience*, 31(6):e4460, 2019.

[44] Hartwig Anzt, Jack Dongarra, Goran Flegar, and Enrique S Quintana-Ortí. Variable-size batched gauss–jordan elimination for block-jacobi preconditioning on graphics processors. *Parallel Computing*, 81:131–146, 2019.

[45] Hartwig Anzt, Goran Flegar, Thomas Grützmacher, and Enrique S Quintana-Ortí. Toward a modular precision ecosystem for high-performance computing. *The International Journal of High Performance Computing Applications*, page 1094342019846547, 2019.

[46] Heike Jagode, Anthony Danalis, Hartwig Anzt, and Jack Dongarra. Papi software-defined events for in-depth performance analysis. *The International Journal of High Performance Computing Applications*, page 1094342019846287, 2019.

[47] Hartwig Anzt, Edmond Chow, and Jack Dongarra. Parilut—a new parallel threshold ilu factorization. *SIAM Journal on Scientific Computing*, 40(4):C503–C519, 2018.

[48] Hartwig Anzt, Thomas K Huckle, Jürgen Bräckle, and Jack Dongarra. Incomplete sparse approximate inverses for parallel preconditioning. *Parallel Computing*, 71:1–22, 2018.

[49] Hartwig Anzt, Moritz Kreutzer, Eduardo Ponce, Gregory D Peterson, Gerhard Wellein, and Jack Dongarra. Optimization and performance evaluation of the idr iterative krylov solver on GPUs. *The International Journal of High Performance Computing Applications*, 32(2):220–230, 2018.

[50] Edmond Chow, Hartwig Anzt, Jennifer Scott, and Jack Dongarra. Using jacobi iterations and blocking for solving sparse triangular systems in incomplete factorization preconditioning. *Journal of Parallel and Distributed Computing*, 119:219–230, 2018.

[51] Hartwig Anzt, Mark Gates, Jack Dongarra, Moritz Kreutzer, Gerhard Wellein, and Martin Köhler. Preconditioned krylov solvers on GPUs. *Parallel Computing*, 68:32–44, 2017.

[52] Hartwig Anzt, Stanimire Tomov, and Jack Dongarra. On the performance and energy efficiency of sparse linear algebra on GPUs. *The International Journal of High Performance Computing Applications*, 31(5):375–390, 2017.

[53] Jack Dongarra, Stanimire Tomov, Piotr Luszczek, Jakub Kurzak, Mark Gates, Ichitaro Yamazaki, Hartwig Anzt, Azzam Haidar, and Ahmad Abdelfattah. With extreme computing, the rules have changed. *Computing in Science & Engineering*, 19(3):52, 2017.

[54] Ahmad Abdelfattah, Hartwig Anzt, Jack Dongarra, Mark Gates, Azzam Haidar, Jakub Kurzak, Piotr Luszczek, Stanimire Tomov, Ichitaro Yamazaki, and Asim YarKhan. Linear algebra software for large-scale accelerated multicore computing. *Acta Numerica*, 25:1–160, 2016.

[55] Hartwig Anzt, Edmond Chow, Jens Saak, and Jack Dongarra. Updating incomplete factorization preconditioners for model order reduction. *Numerical Algorithms*, 73(3):611–630, 2016.

[56] Hartwig Anzt, Jack Dongarra, and Enrique S Quintana-Ortí. Fine-grained bit-flip protection for relaxation methods. *Journal of Computational Science*, 2016.

[57] José Ignacio Aliaga Estellés, Hartwig Anzt, Maribel Castillo Catalán, Juan Carlos Fernández Fernández, Germán León Navarro, Joaquín Pérez, and Enrique S Quintana Ortí. Unveiling the performance-energy trade-off in iterative linear system solvers for multithreaded processors. *Concurrency and Computation: Practice and Experience*, 2015.

[58] Hartwig Anzt, Blake Haugen, Jakub Kurzak, Piotr Luszczek, and Jack Dongarra. Experiences in autotuning matrix multiplication for energy minimization on GPUs. *Concurrency and Computation: Practice and Experience*, 27(17):5096–5113, 2015.

[59] Hartwig Anzt, Stanimire Tomov, Piotr Luszczek, William Sawyer, and Jack Dongarra. Acceleration of GPU-based krylov solvers via data transfer reduction. *The International Journal of High Performance Computing Applications*, 29(3):366–383, 2015.

[60] Jakub Kurzak, Hartwig Anzt, Mark Gates, and Jack Dongarra. Implementation and tuning of batched Cholesky factorization and solve for nvidia GPUs. *IEEE Transactions on Parallel and Distributed Systems*, 27(7):2036–2048, 2015.

[61] Hartwig Anzt, Armen Beglarian, Suren Chilingaryan, Andrew Ferrone, Vincent Heuveline, and Andreas Kopmann. A unified energy footprint for simulation software. *Computer Science-Research and Development*, 29(2):131–138, 2014.

[62] Hartwig Anzt and ES Quintana-Ortí. Improving the energy efficiency of sparse linear system solvers on multicore and manycore systems. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 372(2018):20130279, 2014.

[63] Hartwig Anzt, Stanimire Tomov, Jack Dongarra, and Vincent Heuveline. A block-asynchronous relaxation method for graphics processing units. *Journal of parallel and distributed computing*, 73(12):1613–1626, 2013.

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