

Preprints

- [1] S. Shiber, O. D. Marco, P. M. Motl, B. Munson, D. C. Marcello, J. Frank, P. Diehl, G. C. Clayton, B. N. Skinner, H. Kaiser, G. Daiss, D. Pflüger, and J. E. Staff. Hydrodynamic simulations of WD-WD mergers and the origin of RCB stars. *arXiv preprint arXiv:2404.06864*, 2024, 2404.06864.
- [2] P. K. Jha, P. Diehl, and R. Lipton. Nodal finite element approximation of peridynamics. *arXiv preprint arXiv:2403.05501*, 2024, 2403.05501.
- [3] P. Diehl, S. R. Brandt, M. Morris, N. Gupta, and H. Kaiser. Benchmarking the Parallel 1D Heat Equation Solver in Chapel, Charm++, C++, HPX, Go, Julia, Python, Rust, Swift, and Java. *arXiv preprint arXiv:2307.01117*, 2023.

Books

- [1] P. Diehl, S. R. Brandt, and H. Kaiser. *Parallel C++ – Efficient and Scalable High-Performance Parallel Programming Using HPX*, volume 1. Springer Cham, 2024.

Edited books

- [1] J. Singer, Y. Elkhatib, D. B. Heras, P. Diehl, N. Brown, and A. Ilic, editors. *Euro-Par 2022 International Workshops, Glasgow, UK, August 22–26, 2022, Revised Selected Papers*, volume 13835 of *Lecture Notes in Computer Science (LNCS)*. Springer, 2022.
- [2] P. Diehl, P. Thoman, H. Kaiser, and L. Kale, editors. *Asynchronous Many-Task Systems and Applications*, volume 13861 of *Lecture Notes in Computer Science (LNCS)*. Springer, 2023.
- [3] P. Diehl and R. F. da Silva, editors. *Science Gateways: Accelerating Research and Education—Part I*, volume 25 of *Computing in Science & Engineering*, Los Alamitos, CA, USA, 2023. IEEE.
- [4] P. Diehl and R. da Silva, editors. *Science Gateways: Accelerating Research and Education—Part II*, volume 25 of *Computing in Science & Engineering*, Los Alamitos, CA, USA, 2023. IEEE.
- [5] R. Chaves, D. B. Heras, A. Ilic, D. Unat, R. M. Badia, A. Bracciali, P. Diehl, A. Dubey, O. Sangyoon, S. L. Scott, and L. Ricci, editors. *Euro-Par 2021: Parallel Processing Workshops (Euro-Par 2021 International Workshops, Lisbon, Portugal, August 30–31, 2021, Revised Selected Papers)*, volume 13098 of *Lecture Notes in Computer Science (LNCS)*. Springer, 2021.
- [6] D. Blanco Heras, G. Pallis, H. Herodotou, D. Balouek, P. Diehl, T. Cojean, K. Furlinger, M. H. Kirbey, M. Nardelli, P. Di Sanzo, and e. Zeinalipour, Demetris, editors. *Euro-Par 2023 International Workshops, Limassol, Cypress, 28 August – 1 September, 2023 Revised Selected Papers*, volume 14352 of *Lecture Notes in Computer Science (LNCS)*. Springer, 2024.

- [7] D. Blanco Heras, G. Pallis, H. Herodotou, D. Balouek, P. Diehl, T. Cojean, K. Furlinger, M. H. Kirbey, M. Nardelli, P. Di Sanzo, and e. Zeinalipour, Demetris, editors. *Euro-Par 2023 International Workshops, Limassol, Cypress, 28 August – 1 September, 2023 Revised Selected Papers*, volume 14351 of *Lecture Notes in Computer Science (LNCS)*. Springer, 2024.

Reviews and Surveys

- [1] P. Diehl, R. Lipton, T. Wick, and M. Tyagi. A comparative review of peridynamics and phase-field models for engineering fracture mechanics. *Computational Mechanics*, Feb 2022.
- [2] P. Diehl, S. Prudhomme, and M. Lévesque. A review of benchmark experiments for the validation of peridynamics models. *Journal of Peridynamics and Nonlocal Modeling*, 1(1):14–35, 2019.

Journal Papers

- [1] D. J. Littlewood, M. L. Parks, J. T. Foster, J. A. Mitchell, and P. Diehl. The Peridigm Mesh-free Peridynamics Code. *Journal of Peridynamics and Nonlocal Modeling*, May 2023.
- [2] D. Bhattacharya, R. Lipton, and P. Diehl. Quasistatic fracture evolution using a nonlocal cohesive model. *International Journal of Fracture*, Jun 2023.
- [3] P. Diehl and S. Prudhomme. Coupling approaches for classical linear elasticity and bond-based peridynamic models. *Journal of Peridynamics and Nonlocal Modeling*, Mar 2022.
- [4] P. Diehl and R. Lipton. Quasistatic fracture using nonlinear-nonlocal elastostatics with explicit tangent stiffness matrix. *International Journal for Numerical Methods in Engineering*, May 2022.
- [5] P. Diehl and S. R. Brandt. Interactive C++ code development using C++ Explorer and GitHub classroom for educational purposes. *Concurrency and Computation: Practice and Experience*, 2022.
- [6] M. Birner, P. Diehl, R. Lipton, and M. A. Schweitzer. A fracture multiscale model for peridynamic enrichment within the partition of unity method. *Advances in Engineering Software*, 176, Nov 2022.
- [7] D. C. Marcello, S. Shiber, O. De Marco, J. Frank, G. C. Clayton, P. M. Motl, P. Diehl, and H. Kaiser. Octo-Tiger: a new, 3D hydrodynamic code for stellar mergers that uses HPX parallelisation. *Monthly Notices of the Royal Astronomical Society*, 2021.
- [8] P. K. Jha and P. Diehl. Nlmech: Implementation of finite difference/meshfree discretization of nonlocal fracture models. *Journal of Open Source Software*, 6(65):3020, 2021.

- [9] P. Diehl, D. Marcello, P. Armini, H. Kaiser, S. Shiber, G. C. Clayton, J. Frank, G. Daiss, D. Pflüger, D. C. Eder, A. Koniges, and K. Huck. Performance Measurements within Asynchronous Task-based Runtime Systems: A Double White Dwarf Merger as an Application. *Computing in Science & Engineering*, 2021.
- [10] P. Diehl, G. Daiß, D. Marcello, K. Huck, S. Shiber, H. Kaiser, J. Frank, G. C. Clayton, and D. Pflüger. Octo-Tiger's New Hydro Module and Performance Using HPX+ CUDA on ORNL's Summit. In *2021 IEEE International Conference on Cluster Computing (CLUSTER)*, pages 204–214. IEEE, 2021.
- [11] S. Prudhomme and P. Diehl. On the treatment of boundary conditions for bond-based peridynamic models. *Computer Methods in Applied Mechanics and Engineering*, 372:113391, 2020.
- [12] H. Kaiser, P. Diehl, A. S. Lemoine, B. A. Lebach, P. Amini, A. Berge, J. Biddiscombe, S. R. Brandt, N. Gupta, T. Heller, K. Huck, Z. Khatami, A. Kheirkhahan, A. Reverdell, S. Shirzad, M. Simberg, B. Wagle, W. Wei, and T. Zhang. HPX - The C++ Standard Library for Parallelism and Concurrency. *Journal of Open Source Software*, 5(53):2352, 2020.
- [13] P. Diehl, P. K. Jha, H. Kaiser, R. Lipton, and M. Lévesque. An asynchronous and task-based implementation of peridynamics utilizing HPX—the C++ standard library for parallelism and concurrency. *SN Applied Sciences*, 2(12):2144, 2020.
- [14] R. Delorme, P. Diehl, I. Tabiai, L. L. Lebel, and M. Lévesque. Extracting Constitutive Mechanical Parameters in Linear Elasticity Using the Virtual Fields Method Within the Ordinary State-Based Peridynamic Framework. *Journal of Peridynamics and Nonlocal Modeling*, Jan 2020.
- [15] I. Tabiai, G. Tkachev, P. Diehl, S. Frey, T. Ertl, D. Therriault, and M. Lévesque. Hybrid image processing approach for autonomous crack area detection and tracking using local digital image correlation results applied to single-fiber interfacial debonding. *Engineering Fracture Mechanics*, 216, 2019.
- [16] G. Daiß, P. Amini, J. Biddiscombe, P. Diehl, J. Frank, K. Huck, H. Kaiser, D. Marcello, D. Pfander, and D. Pflüger. From Piz Daint to the Stars: Simulation of Stellar Mergers Using High-level Abstractions. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, SC '19*, pages 62:1–62:37, New York, NY, USA, 2019. ACM.
- [17] P. Diehl, I. Tabiai, F. W. Baumann, D. Therriault, and M. Levesque. Long term availability of raw experimental data in experimental fracture mechanics. *Engineering Fracture Mechanics*, 197:21–26, 2018.
- [18] M. Bußler, P. Diehl, D. Pflüger, S. Frey, F. Sadlo, T. Ertl, and M. A. Schweitzer. Visualization of Fracture Progression in Peridynamics. *Computer & Graphics*, 67:45–57, 2017.
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Series- and conference contributions

- [1] P. Diehl, M. Morris, S. R. Brandt, N. Gupta, and H. Kaiser. Benchmarking the Parallel 1D Heat Equation Solver in Chapel, Charm++, C++, HPX, Go, Julia, Python, Rust, Swift, and Java. In D. Blanco Heras, G. Pallis, H. Herodotou, D. Balouek, P. Diehl, T. Cojean, K. F rlinger, M. H. Kirbey, M. Nardelli, P. Di Sanzo, and D. Zeinalipour, editors, *Euro-Par 2023: Parallel Processing Workshops*, volume 14352 of Lecture Notes in Computer Science (LNCS), pages 120–131, Cham, 2024. Springer Nature Switzerland.
- [2] N. Wu, I. Gonidelis, S. Liu, Z. Fink, N. Gupta, K. Mohammadiporshokooh, P. Diehl, H. Kaiser, and L. V. Kale. Quantifying Overheads in Charm++ and HPX Using Task Bench. In J. Singer, Y. Elkhatib, D. Blanco Heras, P. Diehl, N. Brown, and A. Ilic, editors, *Euro-Par 2022: Parallel Processing Workshops*, pages 5–16, Cham, 2023. Springer Nature Switzerland.
- [3] P. Diehl, G. Daiss, S. Brandt, A. Kheirkhahan, H. Kaiser, C. Taylor, and J. Leidel. Evaluating HPX and Kokkos on RISC-V Using an Astrophysics Application Octo-Tiger. In *Proceedings of the SC '23 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis*, SC-W '23, page 1533–1542, New York, NY, USA, 2023. Association for Computing Machinery.
- [4] P. Diehl, G. Dais, K. Huck, D. Marcello, S. Shiber, H. Kaiser, and D. Pfl ger. Simulating Stellar Merger using HPX/Kokkos on A64FX on Supercomputer Fugaku. In *2023 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pages 682–691, Los Alamitos, CA, USA, may 2023. IEEE Computer Society.
- [5] P. Diehl, S. R. Brandt, and H. Kaiser. Shared Memory Parallelism in Modern C++ and HPX. In P. Diehl, P. Thoman, H. Kaiser, and L. Kale, editors, *Asynchronous Many-Task Systems and Applications*, pages 27–38, Cham, 2023. Springer Nature Switzerland.
- [6] G. Dai , P. Diehl, H. Kaiser, and D. Pfl ger. Stellar Mergers with HPX-Kokkos and SYCL: Methods of Using an Asynchronous Many-Task Runtime System with SYCL. In *Proceedings of the 2023 International Workshop on OpenCL*, IWOCCL '23, New York, NY, USA, 2023. Association for Computing Machinery.
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- [8] G. Dai , P. Diehl, D. Marcello, A. Kheirkhahan, H. Kaiser, and D. Pfl ger. From Task-Based GPU Work Aggregation to Stellar Mergers: Turning Fine-Grained CPU Tasks into Portable GPU Kernels. In *2022 IEEE/ACM International Workshop on Performance, Portability and Productivity in HPC (P3HPC)*, pages 89–99, Los Alamitos, CA, USA, nov 2022. IEEE Computer Society.
- [9] P. Gadikar, P. Diehl, and P. K. Jha. Load balancing for distributed nonlocal models within asynchronous many-task systems. In *2021 IEEE International Parallel and Dis-*

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 - [11] N. Gupta, S. R. Brandt, B. Wagle, N. Wu, A. Kheirkhahan, P. Diehl, F. W. Baumann, and H. Kaiser. Deploying a Task-based Runtime System on Raspberry Pi Clusters. In *2020 IEEE/ACM 5th International Workshop on Extreme Scale Programming Models and Middleware (ESPM2)*, pages 11–20, 2020.
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Short papers

- [1] P. Diehl and S. R. Brandt. Interactive C++ code development using C++ Explorer and GitHub Classroom for educational purposes. In *Proceedings of Gateways 2020*, page 5. Science Gateways Community Institute (SGCI), 2020.
- [2] K. Schatz, C. Müller, P. Gralka, M. Heinemann, A. Straub, C. Schulz, M. Braun, T. Rau, M. Becher, P. Diehl, et al. Visual Analysis of Structure Formation in Cosmic Evolution. In *2019 IEEE Scientific Visualization Conference (SciVis)*, pages 33–41. IEEE, 2019.
- [3] *Peridynamics for Quasistatic Fracture Modeling*, volume Volume 12: Mechanics of Solids, Structures, and Fluids; Micro- and Nano- Systems Engineering and Packaging of ASME International Mechanical Engineering Congress and Exposition, 11 2021. V012T12A041.

Technical reports

- [1] P. Diehl, R. Lipton, A. Pandolfi, and T. Wick. Fracture as an emergent phenomenon. Technical Report Report No. 1/2024, Reporter: Nicole Buczkowski, Mathematisches Forschungsinstitut Oberwolfach, 2024.
- [2] P. Diehl, G. Daiss, K. Huck, D. Marcello, S. Shiber, H. Kaiser, J. Frank, G. C. Clayton, and D. Pflueger. Distributed, combined CPU and GPU profiling within HPX using APEX. *arXiv preprint arXiv:2210.06437*, 2022.
- [3] P. Diehl. Porting Octo-Tiger, an astrophysics program simulating the evolution of star systems based on the fast multipole method on adaptive Octrees. Technical report, HPCI User Report, 2022.
- [4] I. P. Demeshko, P. Diehl, B. Adelstein-Lelbach, R. Buch, H. Kaiser, L. S. Kale, Z. Khatami, A. Koniges, and S. Shirzad. TBAA20: Task-Based Algorithms and Applications. Technical Report LA-UR-21-20928, Los Alamos National Laboratory, 2021.

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- [6] P. Diehl, S. Prudhomme, and P. Seleson. Workshop on experimental and computational fracture mechanics 2020. Technical Report ORNL/TM-2020/1714, Oak Ridge National Laboratory, 2020.
- [7] P. Diehl, R. Lipton, and M. A. Schweitzer. Numerical verification of a bond-based softening peridynamic model for small displacements: Deducing material parameters from classical linear theory. Technical report, Institut für Numerische Simulation, 2016.

Invited talks and Presentations

- [1] P. Diehl. HPX with Spack and Singularity Containers: Evaluating Overheads for HPX/Kokkos using an astrophysics application. Workshop on Asynchronous Many-Task Systems and Applications 2024, 14.02-16.02 2024, Knoxville, US.
- [2] P. Diehl. JOSS and FLOSS for science: Examples for promoting open source software and science communication. SIGDIUS Seminars, 14.06 2023, Virtual event.
- [3] P. Diehl. Simulating Stellar Merger using HPX/Kokkos on A64FX on Supercomputer Fugaku. The 24th IEEE International Workshop on Parallel and Distributed Scientific and Engineering Computing (PDSEC 2023), 15.05-19.05 2023, St. Petersburg, USA.
- [4] P. Diehl. Evaluating HPX and Kokkos on RISC-V using an Astrophysics Application Octo-Tiger. Second International workshop on RISC-V for HPC held in conjunction with the International Conference on High Performance Computing, Network, Storage, and Analysis 2023, 13.11 2023, Denver, US.
- [5] P. Diehl. Recent developments in HPX and Octo-Tiger. Physics & Astronomy Colloquium, 23.1 2023, Baton Rouge, USA.
- [6] P. Diehl. AI-based identification of coupling regions for local and non-local one-dimensional coupling approaches. 17th U. S. National Congress on Computational Mechanics (USNCCM), 23.07-27.07 2023, Albuquerque, US.
- [7] P. Diehl. A Fracture Multiscale Model for Peridynamic enrichment within the Partition of Unity Method: Experimental validation. XVII International Conference on Computational Plasticity, Fundamentals, and Applications (COMPLAS 23), 05.09-07.09 2023, Barcelona, Spain.
- [8] P. Diehl. AI-based identification of coupling regions for local and non-local one-dimensional coupling approaches. 10th International Congress on Industrial and Applied Mathematics (ICIAM), 20.08-25.08 2023, Tokyo, Japan.
- [9] P. Diehl. Benchmarking the Parallel 1D Heat Equation Solver in Chapel, Charm++, C++, HPX, Go, Julia, Python, Rust, Swift, and Java. Asynchronous Many-Task systems for Exascale (AMTE23) held in conjunction with 29th International European Conference on Parallel and Distributed Computing (EuroPar23), 28.08-01.09 2023, Limassol, Cyprus.

- [10] P. Diehl and G. Daiß. Porting our astrophysics application to Arm64FX and adding Arm64FX support using Kokkos. Ookami user group meeting, 10.02 2022, Virtual event.
- [11] P. Diehl and S. Brandt. Interactive C++ code development using C++ Explorer and GitHub Classroom for educational purposes. emBO++ Embedded C++ and C conference, 25.03-23.03 2022, Virtual event.
- [12] P. Diehl. Quasistatic Fracture using Nonlinear-Nonlocal Elastostatics with an Explicit Tangent Stiffness Matrix for arbitrary Poisson ratios. 15th. World Congress on Computational Mechanics (WCCM XV), 31.07-05.08 2022, Virtual event.
- [13] P. Diehl. A Fracture Multiscale Model for Peridynamic enrichment within the Partition of Unity Method. SIAM Annual Meeting (AN22), 11.07-15.07 2022, Pittsburgh, USA.
- [14] P. Diehl. Recent developments in HPX and Octo-Tiger. ISTI Seminar Series, 1.11 2022, Los Alamos, USA.
- [15] P. Diehl. A tale of two approaches for coupling nonlocal and local models. Continuum Mechanics Seminar (CMS), 10.11 2022, Lincoln, USA.
- [16] P. Diehl. Quantifying Overheads in Charm++ and HPX using Task Bench. Asynchronous Many-Task systems for Exascale (AMTE) 2022, 23.08 2022, Glasgow, UK.
- [17] P. Diehl and S. Prudhomme. Challenges for coupling approaches for classical linear elasticity and bond-based peridynamic models for non-uniform meshes and damage. Society of Engineering Science Annual Technical Meeting (SES2022), 16.10-19.10 2022, College Station, USA.
- [18] P. Diehl. Quantifying Overheads in Charm++ and HPX using Task Bench. The Charm++ Workshop 2022, 19.10-20.10 2022, College Park, USA.
- [19] P. Diehl. A Fracture Multiscale Model for Peridynamic enrichment within the Partition of Unity Method. Engineering Mechanics Institute Conference, 01.06-03.06 2022, Baltimore, USA.
- [20] P. Diehl and S. Prudhomme. On the coupling of classical and non-local models for applications in computational mechanics. 19th U.S. National Congress on Theoretical and Applied Mechanics, 19.06-22.06 2022, Austin, USA.
- [21] P. Diehl. Recent developments in HPX and Octo-Tiger. 19th Annual Workshop on Charm++ and Its Application, 18.10-19.10. 2021, Virtual event.
- [22] P. Diehl. Quasistatic Fracture using Nonlinear-Nonlocal Elastostatics with an Analytic Tangent Stiffness Matrix. 16th U.S. National Congress on Computational Mechanics (USNCCM16), 25.07-29.07 2021, Virtual event.
- [23] P. Diehl. A comparative review of peridynamics and phase-field models for engineering fracture mechanics. 14th. World Congress on Computational Mechanics (WCCM XIII), 11.01-15.01 2021, Virtual event.
- [24] P. Diehl. An asynchronous and task-based implementation of peridynamics utilizing HPX—the C++ standard library for parallelism and concurrency. Nonlocal code event, 02.12 2021, Virtual event.

- [25] P. Diehl. A comparative review of peridynamics and phase-field models for engineering fracture mechanics. Engineering Mechanics Institute Conference, 26.05-28.05 2021, Virtual event.
- [26] P. Diehl and S. R. Brandt. Deploying a Task-based Runtime System on Raspberry Pi Clusters. IEEE/ACM 4th International Workshop on Extreme Scale Programming Models and Middleware (ESPM2'20), 09.11-19.11 2020, Virtual event.
- [27] P. Diehl. On the treatment of boundary conditions for bond-based peridynamic models. 3rd Annual Meeting of the SIAM Texas-Louisiana Section, 16.10-18.10. 2020, Virtual event.
- [28] P. Diehl. A review of benchmark experiments for the validation of peridynamics models. Workshop on Experimental and Computational Fracture Mechanics, 26.02-28.02. 2020, Baton Rouge, USA.
- [29] P. Diehl. Long term availability of raw experimental data in experimental fracture mechanics. Scientific Computing Around Louisiana (SCALA), 07.02-08.02. 2020, Baton Rouge, USA.
- [30] P. Diehl. Implementation of Peridynamics utilizing HPX—the C++ standard library for parallelism and concurrency. Engineering Mechanics Institute Conference, 18.06-21.06 2019, Pasadena, USA.
- [31] P. Diehl. Computational Analysis of Coupling Methods for Classical Continuum Mechanics and Peridynamics Models. 15th U.S. National Congress on Computational Mechanics (USNCCM15), 28.07-01.08 2019, Austin, USA.
- [32] P. Diehl. An overview for coupling finite elements with peridynamics. International Congress on Industrial and Applied Mathematics, 15.07-19.07 2019, Valencia, Spain.
- [33] P. Diehl. Extracting constitutive mechanical parameters in linear elasticity using the virtual fields method within the ordinary state-based peridynamics framework. 18th U.S. National Congress for Theoretical and Applied Mechanics, 04.06-09.06 2018, Rosemont, US.
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- [35] P. Diehl. Integration of CUDA Processing within the C++ library for parallelism and concurrency (HPX). IEEE/ACM 4th International Workshop on Extreme Scale Programming Models and Middleware (ESPM2'18), 12.11-16.11 2018, Dallas, USA.
- [36] P. Diehl. A Review for Benchmark Experiments against Peridynamic Models. Nonlocal Methods in Fracture, 15.01-16.01 2018, Austin, USA.
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- [38] P. Diehl. Modeling and Simulation of crack and fractures with peridynamics in brittle materials. HIM Junior Seminar, 08.02. 2017, Bonn, Germany.
- [39] P. Diehl. Experimental Validation of Elastic State Based Peridynamic for PMMA and epoxy materials. 14th U.S. National Congress on Computational Mechanics (US-NCCM14), 17.07-20.07 2017, Montreal, Canada.
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- [42] P. Diehl. Energy equivalence for the horizon independent bond-based peridynamic softening model according to classical theory. The Mathematics of Finite Elements and Applications 2016 (MAFELAP), 14.06-17.06 2016, London, UK.
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