Jed Brown

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Research Interests

Brown's research interests are in fast algorithms and community software infrastructure to enable reliable prediction, inference, and design for science and engineering applications using physically-based models. These activities include multiscale modeling, multilevel linear and nonlinear algebraic solvers, compatible discretization in space and time, discrete and continuous adjoints, numerical optimization, material modeling, and multiphysics coupling disseminated in robust community software packages providing performance on massively parallel and emerging architectures.

Academic Honors & Awards

2015 SIAM/ACM Prize in Computational Science and Engineering (PETSc team)

2014 IEEE TCSC Young Achiever

2014 SIAG/SC Junior Scientist Prize

2004 Outstanding Mathematics Student of the Year, University of Alaska Fairbanks

2004 Outstanding Physics Student of the Year, University of Alaska Fairbanks

2000–2004 Alaska Scholar

Education

Doctor of Science, ETH Zürich, 2011.
Thesis: Computational Methods for Ice Flow Simulation.

M.S. Mathematics, University of Alaska Fairbanks, 2006.

B.S. Mathematics, *magna cum laude*, University of Alaska Fairbanks, 2004.

B.S. Physics, *magna cum laude*, University of Alaska Fairbanks, 2004.

Professional Experience

Associate Professor, Department of Computer Science, University of Colorado Boulder, 2022–

Assistant Professor, Department of Computer Science, University of Colorado Boulder, 2015–2022

Assistant Computational Mathematician, MCS Division, Argonne National Laboratory, 2013–2015

Assistant Professor Adjoint, Department of Computer Science, University of Colorado Boulder, 2013–2015

Argonne Scholar, MCS Division, Argonne National Laboratory, 2012–2013

Postdoctoral Appointee, MCS Division, Argonne National Laboratory, 2011–2012

Research Assistant, ETH Zürich, 2007–2011

Research Technician, University of Alaska Fairbanks, 2006–2007

Research Assistant, University of Alaska Fairbanks, 2003–2006

Teaching Assistant, University of Northern British Columbia, 2003

Journal Papers (*advisees marked with **)

[1] Michael McCabe*, Peter Harrington, Shashank Subramanian, and Jed Brown. "Towards Stability of Autoregressive Neural Operators". In: *Transactions on Machine Learning Research* (2023). ISSN: 2835-8856. URL: https://openreview.net/forum?id=RFfUUtKYOG.

[2] Jeremy L. Thompson*, Jed Brown, and Yunhui He. "Local Fourier Analysis of p-Multigrid for High-Order Finite Element Operators". In: *SIAM Journal on Scientific Computing* 45.3 (2023), S351–S370. DOI: 10.1137/21M1431199.

[3] Junchao Zhang, Jed Brown, Satish Balay, Jacob Faibussowitsch, Matthew Knepley, Oana Marin, Richard Tran Mills, Todd Munson, Barry F. Smith, and Stefano Zampini. "The PetscSF Scalable Communication Layer". In: *IEEE Transactions on Parallel and Distributed Systems* 33 (4 2022). DOI: 10.1109/TPDS.2021.3084070. arXiv: 2102.13018.

[4] Richard Tran Mills, Mark F. Adams, Satish Balay, Jed Brown, Alp Dener, Matthew Knepley, Scott E. Kruger, Hannah Morgan, Todd Munson, Karl Rupp, Barry F. Smith, Stefano Zampini, Hong Zhang, and Junchao Zhang. "Toward Performance-Portable PETSc for GPU-based Exascale Systems". In: *Parallel Computing* 108 (2021), p. 102831. DOI: 10.1016/j.parco.2021.102831. arXiv: 2011.00715 [cs.MS].

[5] Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Ryan Bleile, Jed Brown, Jean-Sylvain Camier, Robert Carson, Noel Chalmers, Veselin Dobrev, Yohann Dudouit, Paul Fischer, Ali Karakus, Stefan Kerkemeier, Tzanio Kolev, Yu-Hsiang Lan, Elia Merzari, Misun Min, Malachi Phillips, Thilina Rathnayake, Robert Rieben, Thomas Stitt, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, Arturo Vargas, Timothy Warburton, and Kenneth Weiss. "GPU Algorithms for Efficient Exascale Discretizations". In: *Parallel Computing* 108 (2021), p. 102841. DOI: 10.1016/j.parco.2021.102841. arXiv: 2109.05072 [cs.DC].

[6] Jed Brown, Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jean-Sylvain Camier, Veselin Dobrev, Yohann Dudouit, Leila Ghaffari*, Tzanio Kolev, David Medina, Will Pazner, Thilina Ratnayaka, Jeremy Thompson*, and Stan Tomov. "libCEED: Fast algebra for high-order element-based discretizations". In: *Journal of Open Source Software* 6.63 (2021), p. 2945. DOI: 10.21105/joss.02945.

[7] Tzanio Kolev, Paul Fischer, Misun Min, Jack Dongarra, Jed Brown, Veselin Dobrev, Tim Warburton, Stanimire Tomov, Mark S. Shephard, Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jean-Sylvain Camier, Noel Chalmers, Yohann Dudouit, Ali Karakus, Ian Karlin, Stefan Kerkemeier, Yu-Hsiang Lan, David Medina, Elia Merzari, Aleksandr Obabko, Will Pazner, Thilina Rathnayake, Cameron W. Smith, Lukas Spies, Kasia Swirydowicz, Jeremy Thompson*, Ananias Tomboulides, and Vladimir Tomov. "Efficient Exascale Discretizations: High-Order Finite Element Methods". In: *International Journal of High Performance Computing Applications* (2021). DOI: 10.1177/10943420211020803. arXiv: 2109.04996 [cs.DC].

[8] Jed Brown, Yunhui He, Scott MacLachlan, Matt Menickelly, and Stefan M Wild. "Tuning Multigrid Methods with Robust Optimization". In: *SIAM Journal on Scientific Computing* 43 (1 2021), A109–A138. DOI: 10.1137/19M1308669. arXiv: 2001.00887.

[9] Paul Fischer, Misun Min, Thilina Rathnayake, Som Dutta, Tzanio Kolev, Veselin Dobrev, Jean-Sylvain Camier, Martin Kronbichler, Tim Warburton, Kasia Świrydowicz, and Jed Brown. "Scalability of High-Performance PDE Solvers". In: *International Journal of High Performance Computing Applications* 34 (5 2020), pp. 562–586. DOI: 10.1177/1094342020915762. arXiv: 2004.06722.

[10] Jed Brown, Yunhui He, and Scott MacLachlan. "Local Fourier analysis of Balancing Domain Decomposition by Constraints Algorithms". In: *SIAM Journal on Scientific Computing* 41 (5 2019), S346–S369. DOI: 10.1137/18M1191373. arXiv: 2108.01841.

[11] Mark F Adams, Eero Hirvijoki, Matthew G Knepley, Jed Brown, Tobin Isaac, and Richard Mills. "Landau Collision Integral Solver with Adaptive Mesh Refinement on Emerging Architectures". In: *SIAM Journal on Scientific Computing* 39.6 (2017), pp. C452–C465. DOI: 10.1137/17M1118828. arXiv: 1702.08880.

[12] Mark F. Adams, Jed Brown, Matthew G. Knepley, and Ravi Samtaney. "Segmental Refinement: A Multigrid Technique for Data Locality". In: *SIAM Journal on Scientific Computing* 38.4 (2016), pp. C426–C440. DOI: 10.1137/140975127. arXiv: 1406.7808.

[13] Debojyoti Ghosh, Emil M. Constantinescu, and Jed Brown. "Efficient Implementation of Nonlinear Compact Schemes on Massively Parallel Platforms". In: *SIAM Journal on Scientific Computing* 37.3 (2015). Also preprint ANL/MCS-P5121-0414, pp. C354–C383. DOI: 10.1137/140989261.

[14] David A. May, Jed Brown, and Laetitia Le Pourhiet. "A scalable, matrix-free multigrid preconditioner for finite element discretizations of heterogeneous Stokes flow". In: *Computer Methods in Applied Mechanics and Engineering* 290.0 (2015), pp. 496–523. ISSN: 0045-7825. DOI: 10.1016/j.cma.2015.03.014.

[15] Jed Brown, Matthew G. Knepley, and Barry F. Smith. "Run-time extensibility and librarization of simulation software". In: *IEEE Computing in Science and Engineering* 17.1 (2015), pp. 38–45. DOI: 10.1109/MCSE.2014.95.

[16] Jed Brown, Barry F. Smith, and Aron Ahmadia. "Achieving textbook multigrid efficiency for hydrostatic ice flow". In: *SIAM Journal on Scientific Computing* 35.2 (2013). Also preprint ANL/MCS-P743-1298, pp. 359–375. DOI: 10.1137/110834512.

[17] David E. Keyes, Lois Curfman McInnes, Carol Woodward, William Gropp, Eric Myra, Michael Pernice, John Bell, Jed Brown, Alain Clo, Jeffrey Connors, Emil Constantinescu, Don Estep, Kate Evans, Charbel Farhat, Ammar Hakim, Glenn Hammond, Glen Hansen, Judith Hill, Tobin Isaac, Xiangmin Jiao, Kirk Jordan, Dinesh Kaushik, Efthimios Kaxiras, Alice Koniges, Kihwan Lee, Aaron Lott, Qiming Lu, John Magerlein, Reed Maxwell, Michael McCourt, Miriam Mehl, Roger Pawlowski, Amanda Peters Randles, Daniel Reynolds, Beatrice Rivière, Ulrich Rüde, Tim Scheibe, John Shadid, Brendan Sheehan, Mark Shephard, Andrew Siegel, Barry Smith, Xianzhu Tang, Cian Wilson, and Barbara Wohlmuth. "Multiphysics Simulations: Challenges and Opportunities". In: *International Journal of High Performance Computing Applications* 27.1 (Feb. 2013). Special issue, pp. 4–83. DOI: 10.1177/1094342012468181.

[18] Tareq M. Malas, Aron J. Ahmadia, Jed Brown, John A. Gunnels, and David E. Keyes. "Optimizing the Performance of Streaming Numerical Kernels on the IBM BlueGene/P PowerPC 450 Processor". In: *International Journal of High Performance Computing Applications* 27.2 (2013), pp. 193–209. DOI: 10.1177/1094342012444795.

[19] Rodney Biezuner, Jed Brown, Grey Ercole, and Eder Martins. "Computing the First Eigenpair of the p-Laplacian via Inverse Iteration of Sublinear Supersolutions". In: *Journal of Scientific Computing* 52 (1 2012), pp. 180–201. ISSN: 0885-7474. DOI: 10.1007/s10915-011-9540-0.

[20] Jed Brown. "Efficient Nonlinear Solvers for Nodal High-Order Finite Elements in 3D". In: *Journal of Scientific Computing* 45 (1 2010), pp. 48–63. ISSN: 0885-7474. DOI: 10.1007/s10915-010-9396-8.

[21] Jason M. Amundson, Mark Fahnestock, Martin Truffer, Jed Brown, Martin P. Lüthi, and Roman J. Motyka. "Ice mélange dynamics and implications for terminus stability, Jakobshavn Isbræ, Greenland". In: *Journal of Geophysical Research* 115 (2010), F01005. DOI: 10.1029/2009JF001405.

[22] Edward Bueler and Jed Brown. "Shallow shelf approximation as a "sliding law" in a thermomechanically coupled ice sheet model". In: *Journal of Geophysical Research-Earth Surface* 114.F3 (2009), F03008. DOI: 10.1029/2008JF001179. arXiv: 0810.3449.

[23] E. Bueler, J. Brown, and C. Lingle. "Exact solutions to the thermomechanically coupled shallow ice approximation: effective tools for verification". In: *J. Glaciol* 53 (2007), pp. 499–516. DOI: 10.3189/002214307783258396.

[24] Edward Bueler, Craig S. Lingle, and Jed Brown. "Fast computation of a viscoelastic deformable Earth model for ice-sheet simulations". In: *Annals of Glaciology* 46 (2007), pp. 97–105. DOI: 10.3189/172756407782871567.

[25] Edward Bueler, Craig S. Lingle, Jed A. Kallen-Brown, David N. Covey, and Latrice N. Bowman. "Exact solutions and numerical verification for isothermal ice sheets". In: *Journal of Glaciology* 51.173 (2005), pp. 291–306. DOI: 10.3189/172756505781829449.

Refereed Proceedings Papers (*advisees marked with* *)

[1] Jeff Hammond, Lisandro Dalcin, Erik Schnetter, Marc Pérache, Jean-Baptiste Besnard, Jed Brown, Gonzalo Brito Gadeschi, Simon Byrne, Joseph Schuchart, and Hui Zhou. "MPI Application Binary Interface Standardization". In: *Proceedings of the 30th European MPI Users' Group Meeting*. Best Paper Award. 2023, pp. 1–12. DOI: 10.1145/3615318.3615319.

[2] Jake Tronge, Howard Pritchard, and Jed Brown. "Improving MPI Safety for Modern Languages". In: *Proceedings of the 30th European MPI Users' Group Meeting*. 2023, pp. 1–11. DOI: 10.1145/3615318.3615328.

[3] Michael McCabe* and Jed Brown. "Learning to Assimilate in Chaotic Dynamical Systems". In: *Thirty-Fifth Conference on Neural Information Processing Systems*. Acceptance Rate 25.6%. 2021. URL: https://proceedings.neurips.cc/paper/2021/hash/65cc2c8205a05d7379fa3a6386f710e1-Abstract.html.

[4] Arash Mehraban*, Jeremy Thompson*, Jed Brown, Richard Regueiro, Valeria Barra*, and Henry Tufo. "Simulating Compressible and Nearly-Incompressible Linear Elasticity Using an Efficient Parallel Scalable Matrix-Free High-Order Finite Element Method". In: *Proceedings of WCCM-ECCOMAS2020*. 2021, pp. 1–15. DOI: 10.23967/wccm-eccomas.2020.302.

[5] Arash Mehraban*, Jed Brown, Valeria Barra*, Henry Tufo, Jeremy Thompson*, and Richard Regueiro. "Efficient Residual and Matrix-Free Jacobian Evaluation for Three-Dimensional Tri-Quadratic Hexahedral Finite Elements With Nearly-Incompressible Neo-Hookean Hyperelasticity Applied to Soft Materials on Unstructured Meshes in Parallel, With PETSc and libCEED". In: *ASME International Mechanical Engineering Congress and Exposition*. Vol. Volume 12: Mechanics of Solids, Structures, and Fluids. V012T12A027. Nov. 2020. DOI: 10.1115/IMECE2020-24522.

[6] Valeria Barra*, Jed Brown, Jeremy Thompson*, and Yohann Dudouit. "High-performance operator evaluations with ease of use: libCEED's Python interface". In: *Proceedings of the 19th Python in Science Conference*. Ed. by Meghann Agarwal, Chris Calloway, Dillon Niederhut, and David Shupe. 2020, pp. 85–90. DOI: 10.25080/Majora-342d178e-00c.

[7] Michael McCabe* and Jed Brown. "Using Differentiable Physics for Self-Supervised Assimilation of Chaotic Dynamical Systems". In: *Workshop on Differentiable Vision, Graphics, and Physics in Machine Learning at NeurIPS 2020*. 2020. URL: https://montrealrobotics.ca/diffcvgp/assets/papers/16.pdf.

[8] Tristan Konolige* and Jed Brown. "A Parallel Solver for Graph Laplacians". In: *Proceedings of the Platform for Advanced Scientific Computing (PASC)*. Best Paper Award (25%). 2018. DOI: 10.1145/3218176.3218227. arXiv: 1705.06266.

[9] Dmitry Duplyakin*, Jed Brown, and Donna Calhoun. "Evaluating Active Learning with Cost and Memory Awareness". In: *2018 IEEE International Parallel and Distributed Processing Symposium (IPDPS)*. Acceptance Rate 24.4%. IEEE. 2018, pp. 214–223. DOI: 10.1109/IPDPS.2018.00031.

[10] Dmitry Duplyakin*, Jed Brown, and Robert Ricci. "Active Learning in Performance Analysis". In: *Proceedings of the IEEE Cluster Conference*. Acceptance Rate 24.1%. Sept. 2016. DOI: 10.1109/CLUSTER.2016.63. URL: http://www.flux.utah.edu/paper/duplyakin-cluster16.

[11] Dave A. May, Jed Brown, and Laetitia Le Pourhiet. "pTatin3D: High-Performance Methods for Long-Term Lithospheric Dynamics". In: *Proceedings of SC14: International Conference for High Performance Computing, Networking, Storage and Analysis*. Acceptance Rate 21%. ACM. 2014. DOI: 10.1109/SC.2014.28.

[12] Matthew G. Knepley, Jed Brown, Lois Curfman McInnes, and Barry F. Smith. "Accurately Citing Software and Algorithms Used in Publications". In: *Workshop towards Sustainable Software for Science: Practice and Experiences* (*WSSSPE*). 2013. DOI: 10.6084/m9.figshare.785731.

[13] Barry F. Smith Jed Brown Matthew G. Knepley. "Run-time extensibility: anything less is unsustainable". In: *Workshop towards Sustainable Software for Science: Practice and Experiences* (*WSSSPE*). 2013. DOI: 10.6084/m9.figshare.791571.

[14] Jed Brown and Peter Brune. "Low-rank quasi-Newton updates for robust Jacobian lagging in Newton-type methods". In: *International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering*. 2013, pp. 2554–2565.

[15] Jed Brown, Matthew G. Knepley, David A. May, Lois C. McInnes, and Barry F. Smith. "Composable Linear Solvers for Multiphysics". In: *Proceeedings of the 11th International Symposium on Parallel and Distributed Computing* (*ISPDC 2012*). IEEE Computer Society, 2012, pp. 55–62. DOI: 10.1109/ISPDC.2012.16.

[16] K. Burckhardt, D. Szczerba, J. Brown, K. Muralidhar, and G. Székely. "Fast Implicit Simulation of Oscillatory Flow in Human Abdominal Bifurcation using a Schur Complement Preconditioner". In: *Euro-Par 2009 Parallel Processing*. Ed. by H. Sips, D. Epema, and H.-X. Lin. Vol. 5704. Lecture Notes in Computer Science. Springer, Aug. 2009, pp. 747–759. DOI: 10.1007/978-3-642-03869-3_70.

Refereed Book Chapters

[1] Kenneth E. Jansen and Jed Brown. "Numerical Methods in Turbulence Simulation". In: Academic Press, 2022. Chap. Finite element methods for turbulence. ISBN: 978-0-323-91144-3. DOI: 10.1016/B978-0-32-391144-3.00011-5.

[2] Kenneth E. Jansen, Michel Rasquin, Jed Brown, Cameron Smith, Mark S. Shephard, and Chris Carothers. "Exascale Scientific Applications". In: Chapman and Hall/CRC Press, 2017. Chap. Extreme scale unstructured adaptive CFD for aerodynamic flow control. DOI: 10.1201/b21930-15.

[3] Satish Balay, Jed Brown, Matthew G. Knepley, Lois McInnes, and Barry Smith. "Software Engineering for Science". In: Taylor & Francis, 2016. Chap. Providing Mixed Language and Legacy Support within a Library, pp. 201–215. DOI: 10.1201/9781315368924.

Technical Reports (*advisees marked with* *)

[1] Zach Atkins*, Jed Brown, Leila Ghaffari*, Rezgar Shakeri*, Ren Stengel*, and Jeremy L Thompson*. *Ratel User Manual*. Version v0.3.0. Nov. 2023. DOI: 10.5281/zenodo.10063890.

[2] Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Veselin Dobrev, Yohann Dudouit, Leila Ghaffari*, Sebastian Grimberg, Tzanio Kolev, David Medina, Will Pazner, Thilina Ratnayaka, Rezgar Shakeri*, Jeremy L Thompson*, Stanimire Tomov, and James Wright III*. *libCEED User Manual*. Version 0.12.0. Nov. 2023. DOI: 10.5281/zenodo.10062388.

[3] Satish Balay, Shrirang Abhyankar, Mark F. Adams, Steven Benson, Jed Brown, Peter Brune, Kris Buschelman, Emil Constantinescu, Lisandro Dalcin, Alp Dener, Victor Eijkhout, Jacob Faibussowitsch, William D. Gropp, Václav Hapla, Tobin Isaac, Pierre Jolivet, Dmitry Karpeev, Dinesh Kaushik, Matthew G. Knepley, Fande Kong, Scott Kruger, Dave A. May, Lois Curfman McInnes, Richard Tran Mills, Lawrence Mitchell, Todd Munson, Jose E. Roman, Karl Rupp, Patrick Sanan, Jason Sarich, Barry F. Smith, Stefano Zampini, Hong Zhang, Hong Zhang, and Junchao Zhang. *PETSc/TAO Users Manual*. Tech. rep. ANL-21/39 - Revision 3.20. Argonne National Laboratory, 2023. DOI: 10.2172/2205494.

[4] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Ramesh Balakrishnan, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Hugh Carson, Robert Carson, Noel Chalmers, Matthew Churchfield, Veselin Dobrev, Sebastian Grimberg, Yichen Guo, Stefan Kerkemeier, Yu-Hsiang Lan, Victor A. Mateevitsi, Matthew McCall, Elia Merzari, Misun Min, Ketan Mittal, Will Pazner, Malachi Phillips, Finnur Pind, Thilina Ratnayaka, Robert N. Rieben, Kris Rowe, Mark S. Shephard, Cameron W. Smith, Thomas Stitt, Michael Sprague, Amik St-Cyr, Solvi Thrastarson, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, Arturo Vargas, Tim Warburton, and Kenneth Weiss. *CEED ECP Milestone Report: Document and popularize CEED-developed software and standards*. Oct. 2023. DOI: 10.5281/zenodo.10023494.

[5] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Zachary Atkins*, Adeleke Bankole*, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Robert Carson, Noel Chalmers, Veselin Dobrev, John Holmen, Kenneth E Jansen, Stefan Kerkemeier, Yu-Hsiang Lan, Damon McDougall, Elia Merzari, Misun Min, Malachi Phillips, Thilina Ratnayaka, Kris Rowe, Mark S. Shephard, Cameron W. Smith, Jeremy L. Thompson*, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, Umesh Unnikrishnan, Arturo Vargas, Tim Warburton, and James Wright III*. *CEED ECP Milestone Report: Support ECP applications in their exascale challenge problem runs*. Apr. 2023. DOI: 10.5281/zenodo.7820316.

[6] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Adeleke Bankole*, Natalie Beams, Michael Brazell, Jed Brown, Jean-Sylvain Camier, Noel Chalmers, Matthew Churchfield, Veselin Dobrev, Yohann Dudouit, Leila Ghaffari*, John Holmen, Stefan Kerkemeier, Yu-Hsiang Lan, Yimin Lin, Damon McDougall, Elia Merzari, Misun Min, Ketan Mittal, Will Pazner, Malachi Phillips, Thilina Ratnayaka, Kris Rowe, Mark S. Shephard, Cameron W. Smith, Michael Sprague, Jeremy L. Thompson*, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, Tim Warburton, and James Wright* III. *CEED ECP Milestone Report: Improve performance and capabilities of CEED-enabled ECP applications on Frontier/Aurora EA*. Sept. 2022. DOI: 10.5281/zenodo.7202571.

[7] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Robert Carson, Noel Chalmers, Veselin Dobrev, Yohann Dudouit, Leila Ghaffari*, Aditya Y. Joshi, Stefan Kerkemeier, Yu-Hsiang Lan, Damon McDougall, David Medina, Misun Min, Abhishek Mishra, Will Pazner, Malachi Phillips, Thilina Ratnayaka, Mark S. Shephard, Morteza H. Siboni, Cameron W. Smith, Jeremy L. Thompson*, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, and Tim Warburton. *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for more robust exascale applications*. Apr. 2022. DOI: 10.5281/zenodo.6514857.

[8] Tzanio Kolev, Paul Fischer, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Noel Chalmers, Veselin Dobrev, Yohan Dudouit, Stefan Kerkemeier, Yu-Hsiang Lan, Yimin Lin, Neil Lindquist, Damon McDougall, David Medina, Elia Merzari, Misun Min, Scott Moe, Will Pazner, Malachi Phillips, Thilina Ratnayaka, Kris Rowe, Mark S. Shephard, Cameron W. Smith, Stanimire Tomov, and Tim Warburton. *CEED ECP Milestone Report: Port and optimize the CEED software stack to Aurora / Frontier EA Systems*. Sept. 2021. DOI: 10.5281/zenodo.5542244. URL: https://doi.org/10.5281/zenodo.5542244.

[9] Tzanio Kolev, Paul Fischer, Anthony P. Austin, Andrew T. Barker, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Noel Chalmers, Veselin Dobrev, Yohann Dudouit, and et al. *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for large-scale GPU-accelerated simulations*. Mar. 2021. DOI: 10.5281/zenodo.4672664.

[10] Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Veselin Dobrev, Yohann Dudouit, Leila Ghaffari*, Tzanio Kolev, David Medina, Thilina Rathnayake, Jeremy L Thompson*, and Stanimire Tomov. *libCEED User Manual*. Version 0.7. Sept. 2020. DOI: 10.5281/zenodo.4302737.

[11] Tristan Konolige* and Jed Brown. *Multigrid for Bundle Adjustment*. 2020. arXiv: 2007.01941 [cs.CV].

[12] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Noel Chalmers, Veselin Dobrev, Stefan Kerkemeier, Yu-Hsiang Lan, Elia Merzari, Misun Min, Malachi Phillips, Thilina Ratnayaka, Kris Rowe, Jeremy Thompson*, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, and Tim Warburton. *CEED ECP Milestone Report: Support CEED-enabled ECP applications in their preparation for Aurora/Frontier*. Sept. 2020. DOI: 10.5281/zenodo.4146401.

[13] Tzanio Kolev, Paul Fischer, Ahmad Abdelfattah, Shreyas Ananthan, Valeria Barra*, Natalie Beams, Ryan Bleile, Jed Brown, Robert Carson, Jean-Sylvain Camier, Matthew Churchfield, Veselin Dobrev, Jack Dongarra, Yohann Dudouit, Ali Karakus, Stefan Kerkemeier, YuHsiang Lan, David Medina, Elia Merzari, Misun Min, Scott Parker, Thilina Ratnayaka, Cameron Smith, Michael Sprague, Thomas Stitt, Jeremy Thompson*, Ananias Tomboulides, Stanimire Tomov, Vladimir Tomov, Arturo Vargas, Tim Warburton, and Kenneth Weiss. *CEED ECP Milestone Report: Improve performance and capabilities of CEED-enabled ECP applications on Summit/Sierra*. May 2020. DOI: 10.5281/zenodo.3860804.

[14] Lorena A. Barba, Lecia J. Barker, Douglas S. Blank, Jed Brown, Allen B. Downey, Timothy George, Lindsey J. Heagy, Kyle T. Mandli, Jason K. Moore, David Lippert, Kyle E. Niemeyer, Ryan R. Watkins, Richard H. West, Elizabeth Wickes, Carol Willing, and Michael Zingale. *Teaching and Learning with Jupyter*. GitHub, 2019. URL: https://jupyter4edu.github.io/jupyter-edu-book/.

[15] Lorena Barba, Juanjo Bazán, Jed Brown, Roman V Guimera, Melissa Gymrek, Alex Hanna, Lindsey J Heagy, Kathryn D Huff, Daniel S Katz, Christopher R Madan, and et al. *Giving software its due through community-driven review and publication*. Apr. 2019. DOI: 10.31219/osf.io/f4vx6. URL: osf.io/f4vx6.

[16] Stanimire Tomov, Ahmad Abdelfattah, Valeria Barra*, Natalie Beams, Jed Brown, Jean-Sylvain Camier, Veselin Dobrev, Jack Dongarra, Yohann Dudouit, Paul Fischer, Ali Karakus, Stefan Kerkemeier, Tzanio Kolev, YuHsiang Lan, Elia Merzari, Misun Min, Aleks Obabko, Scott Parker, Thilina Ratnayaka, Jeremy Thompson*, Ananias Tomboulides, Vladimir Tomov, and Tim Warburton. *CEED ECP Milestone Report: Performance tuning of CEED software and 1st and 2nd wave apps*. Oct. 2019. DOI: 10.5281/zenodo.3477618.

[17] Mark Shephard, Valeria Barra*, Jed Brown, Jean-Sylvain Camier, Yohan Dudouit, Paul Fischer, Tzanio Kolev, David Medina, Misun Min, Cameron Smith, Morteza H. Siboni, Jeremy Thompson*, and Tim Warburton. *CEED ECP Milestone Report: Improved Support for Parallel Adaptive Simulation in CEED*. July 2019. DOI: 10.5281/zenodo.3336420.

[18] Jed Brown, Ahmad Abdelfattah, Valeria Barra*, Veselin Dobrev, Yohann Dudouit, Paul Fischer, Tzanio Kolev, David Medina, Misun Min, Thilina Ratnayaka, Cameron Smith, Jeremy Thompson*, Stanimire Tomov, Vladimir Tomov, and Tim Warburton. *CEED ECP Milestone Report: Public release of CEED 2.0*. Mar. 2019. DOI: 10.5281/zenodo.2641316.

[19] Jean-Sylvain Camier, Paul Fischer, Ali Karakus, Stefan Kerkemeier, Tzanio Kolev, Yu-Hsiang Lan, David Medina, Elia Merzari, Misun Min, Aleks Obabko, Thilina Ratnayaka, Dillon Shaver, Ananias Tomboulides, Vladimir Tomov, and Tim Warburton. *CEED ECP Milestone Report: Engage second wave ECP/CEED applications*. Mar. 2019. DOI: 10.5281/zenodo.2542359.

[20] Shrirang Abhyankar, Jed Brown, Emil M. Constantinescu, Debojyoti Ghosh, Barry F. Smith, and Hong Zhang. *PETSc/TS: A Modern Scalable ODE/DAE Solver Library*. 2018. arXiv: 1806.01437 [math.NA].

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[32] Mark F. Adams, Jed Brown, and Matthew G. Knepley. "Low-communication techniques for extreme-scale multilevel solvers". In: *Exascale Mathematics Workshop, Aug 21–22, Washington, DC*. DOE Office of Advanced Scientific Computing Research. 2013.

[33] Jennifer Arrigo, Jed Brown, Louise Kellogg, Lorraine Hwang, Scott Peckham, and David Tarboton. *EarthCube Modeling Workshop Results*. Tech. rep. Computational Infrastructure for Geodynamics, 2013. URL: http://geodynamics.org/cig/community/workshops/Earthcube13/ExecSummary.

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[37] Mark Adams, Jed Brown, and Barry F. Smith. "Exascale Programming Models Must Vigorously Enable Libraries". In: *DOE Exascale Research Conference*. 2012.

[38] Mihai Anitescu, Jed Brown, Paul Fischer, Sven Leyffer, Lois Curfman McInnes, Todd Munson, and Barry F. Smith. "Exascale Co-design Opportunities: Multilevel Approaches for Hierarchical Models, Architectures, Algorithms, and Software". In: *DOE Exascale Research Conference*. 2012.

[39] L. Ridgway Scott, Jed Brown, George W. Bergantz, Dan Cooley, Clint Dawson, Maarten de Hoop, Donald Estep, Natasha Flyer, Efi Foufoula-Georgiou, Michael Ghil, Matthew Knepley, Randall J. LeVeque, Lek-Heng Lim, Serge Prudhomme, Adrian Sandu, Frederik J. Simons, Philip B. Stark, Michael Stein, Seth Stein, Toshiro Tanimoto, Daniel Tartakovsky, Jonathan Weare, Robert Weiss, Grady B. Wright, and Dave Yuen. *Fostering Interactions Between the Geosciences and Mathematics, Statistics, and Computer Science*. Tech. rep. 2012-02. University of Chicago, 2012.

Papers In Review (*advisees marked with* *)

[1] Martin Schreiber and Jed Brown. "A generalized rational approximation of exponential integration (REXI) for massively parallel time integration". working paper or preprint. Dec. 2023 (submitted). URL: `https://hal.science/hal-04363335`.

[2] Jed Brown, Valeria Barra*, Natalie Beams, Leila Ghaffari*, Matthew Knepley, William Moses, Rezgar Shakeri*, Karen Stengel*, Jeremy L. Thompson*, and Junchao Zhang. *Performance Portable Solid Mechanics via Matrix-Free p-Multigrid*. 2022. DOI: `10.48550/ARXIV.2204.01722`. URL: `https://arxiv.org/abs/2204.01722`.

[3] Rezgar Shakeri*, Leila Ghaffari*, Karen Stengel*, Jeremy L. Thompson*, and Jed Brown. *Stable numerics for finite-strain elasticity*. 2023 (submitted).

Grants and Contracts

G. Bisht (Lead PI, PNNL), J. Brown (sole CU Boulder PI), *Capturing the Dynamics of Compound Flooding in E3SM*, DOE Office of Biological and Environmental Research (SciDAC), 2022-11-01 to 2027-10-31, CU Boulder Award $566k via PNNL subcontract (my share $566k).

T. Kolev (Lead PI), P. Fischer, M. Min, J. Dongarra, T. Warburton, J. Brown (sole CU Boulder PI), M. Shepherd, *Center for Efficient Exascale Discretization*, DOE Exascale Computing Project, 2022–2023, CU Boulder Award $135k (my share $135).

L. Curfman McInnes (Lead PI, ANL), B. Smith, M. Adams, S. Balay, J. Brown (sole CU Boulder PI), T. Isaac, M. Knepley, O. Marin, P. Sanan, H. Zhang, *Extending PETSc's Composable Solvers*, DOE Office of Advanced Scientific Computing Research, 2021-10-01 to 2024-09-30, CU Boulder Award $333k via ANL subcontract (my share $333k).

G. Bisht (Lead PI, PNNL), J. Brown (sole CU Boulder PI), N. Collier, J. Frederick, G. Hammond, S. Karra, M. Knepley, *Terrestrial dynamical cores for the E3SM to simulate water cycle*, DOE Office of Biological and Environmental Research (SciDAC), 2021-05-01 to 2022-04-30, CU Boulder Award $144k via PNNL subcontract (my share $144k).

T. Kolev (Lead PI), P. Fischer, M. Min, J. Dongarra, T. Warburton, J. Brown (sole CU Boulder PI), M. Shepherd, *Center for Efficient Exascale Discretization*, DOE Exascale Computing Project, 2020–2022, CU Boulder Award $420k (my share $420k).

R. Regueiro (PI), J. Brown (Co-PI), A. Clarke, A. Doostan, H. Tufo, *Center for Micromorphic Multiphysics Porous and Particulate Materials Simulations within Exascale Computing Workflows*, 2020-06-01 to 2025-05-31, DOE PSAAP, Total Award $13,158k (my share $2,172k).

Tzu-Wei Fang (PI), A. Doostan, T. Fuller-Rowell, D. Hysell, E. Sutton, J. Brown, *Collaborative Research: Forecasting the small-scale plasma structures in the Ionosphere-Thermosphere system*, NSF, 2020–2023, Total Award $2,399k (my share $34k).

J. Brown (PI), *Extending PETSc's Composable Hierarchical Solvers*, DOE Office of Advanced Scientific Computing Research, DE-SC0016140 (renewal), 2019-07-01 to 2022-06-30, Award $290k.

T. Kolev (Lead PI), P. Fischer, M. Min, J. Dongarra, T. Warburton, J. Brown (CU Boulder PI), M. Shepherd, *Center for Efficient Exascale Discretization*, DOE Exascale Computing Project, 2019–2020, CU Boulder Award $400k (my share $400k).

J. Brown (Lead PI), T. Isaac (GaTech), *Collaborative Research: Elements: Software: NSCI: Constitutive Relation Inference Toolkit* (*CRIKit*), NSF CSSI, 2019-01-01 to 2021-12-31, Total Award $593k (CU Boulder $293k, my share $293k).

G. Bisht (Lead PI, LBNL), J. Brown (sole CU Boulder PI), N. Collier, J. Frederick, G. Hammond, S. Karra, M. Knepley, *Terrestrial dynamical cores for the ACME to simulate water cycle*, DOE Office of Biological and Environmental Research (SciDAC), 2018-05-10 to 2021-09-30, CU Boulder Award $188k (my share $188k).

K. Jansen (Lead PI), J. Brown (Co-PI), A. Doostan, J. Evans, J. Farnsworth, *Collaborative Research: NSCI SI2-S2I2: Conceptualization of CFDSI: Model, Data, and Analysis Integration for End-to-End Support of Fluid Dynamics Discovery and Innovation*, NSF OAC 1743178, 2018-03-01 to 2019-08-31, Award $257k (my share $0 — not split by co-PI).

J. Brown (PI), *Extending PETSc's Composable Hierarchical Solvers*, DOE Office of Advanced Scientific Computing Research, DE-SC0016140, 2016-07-01 to 2019-06-30, Award $285k.

T. Kolev (Lead PI), P. Fischer, M. Min, J. Dongarra, T. Warburton, J. Brown (sole CU Boulder PI), M. Shepherd, *Center for Efficient Exascale Discretization*, DOE Exascale Computing Project, 2016–2018, CU Boulder Award $400k (my share $400k).

M. Adams, M. Knepley, J. Brown (Co-PI), *Intel Parallel Computing Center at Rice University*, Intel, 2016-07-01 to 2017-06-30, Award to Rice University $200k.

K. Jansen (PI), Michael Amitay, John A. Evans, John A. Farnsworth, Philippe Spalart, Edward Whalen, Jed Brown (Co-PI), Chris Carothers, Onkar Sahni, Cameron Smith, Michel Rasquin, Igor Bolotnov, *Extreme Scale Unstructured Adaptive CFD: From Multiphase Flow to Aerodynamic Flow Control*, Aurora Early Science Project (early access to: (1) simulators of next machine to be placed at ANL, (2) hardware and software vendors during planning, (3) lab personnel, (4) hardware and software prototypes, (5) actual hardware during first three months before being made available to science community `https://aurora.alcf.anl.gov/`, 2016-12-01 to 2021-12-31, supports a post-doc and 660M hours of computer time in the first 90 days the machine is available.

M. Adams, M. Knepley, J. Brown (Co-PI), *Intel Parallel Computing Center at University of Chicago*, Intel, 2015-07-01 to 2016-06-30, Award to University of Chicago $200k.

Awards declined by recipient

Sajid Ali (fellow), Jed Brown (mentor), *Scalable and efficient reconstruction methods for scattering-based imaging*, 2-year NSF-funded postdoc in CI Fellows program 2021–2023; declined by Ali to accept position at Fermilab.

HPC Allocations

K. Jansen (lead), J. Brown, J. Evans, A. Doostan, S. Becker, *Online Machine Learning for Large-Scale Turbulent Simulations*, INCITE 2024, 375k node hours on ALCF Aurora.

K. Jansen (lead), S. Becker, J. Brown, J. Evans, A. Doostan, *Data Analytics and Machine Learning for Exascale CFD*, Aurora Early Science Program, includes funding for ALCF postdoc Riccardo Balin, who we recruited.

K. Jansen (lead), J. Brown, J. Evans, M. Rasquin, O. Sahni, M. Shepherd, *Adaptive DES of a Vertical*

Tail/Rudder Assembly with Active Flow Control, DOE INCITE 2017, 90M ALCF hours.

K. Jansen (lead), J. Brown, M. Rasquin, O. Sahni, M. Shepherd, C. Smith, *Adaptive Detached-Eddy Simulation of a High Lift Wing with Active Flow Control*, DOE INCITE 2016, 70M ALCF hours.

K. Jansen (lead), J. Brown, I. Bolotnov, C. Carothers, J. Evans, B. Matthews, M. Rasquin, O. Sahni, M. Shepherd, C. Smith, *Extreme Scale Unstructured Adaptive CFD: From Multiphase Flow to Aerodynamic Flow Control*, ALCF Theta Early Science Program Tier 2, 5M ALCF hours.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2023, 500 CPU + 1500 GPU Perlmutter node hours.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2022, 2000 CPU + 1500 GPU Perlmutter node hours.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2021, 1M NERSC MPP hours, 500 SRUs.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2020, 1.54M NERSC MPP hours, 500 SRUs.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2019, 1.54M NERSC MPP hours, 500 SRUs.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2018, 1.87M NERSC MPP hours, 500 SRUs.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2017, 2.0M NERSC MPP hours, 1000 SRUs.

J. Brown (lead), L. Curfman McInnes, *Composable Hierarchically Nested Solvers*, NERSC Allocation 2018, 1.5M NERSC MPP hours, 1000 SRUs.

Proposals declined (as PI or co-PI)

A. Doostan (PI), S. Becker, J. Brown, J. Evans, K. Jansen, *Scalable Data Reduction Techniques for Extreme-Scale Unstructured PDE Simulations*, DOE PSAAP, 2019.

J. Brown (PI), J. Kay, C. Monteleoni, *What is predictable? Quantifying Internal Model and Natural Variability for Actionable Policy*, Schmidt Futures VESRI, 2019.

J. Brown (PI), *Parallel Multiscale Bundle Adjustment*, Google, 2017.

M. Adams (PI), B. Smith, A. Bhattacharjee, M. Knepley, D. Brennan, B. Griffith, A. Donev, R. Brower, T. Isaac, B. Riviere, J. Brown, *Structure Preserving, Adaptive, Composable methods for Extreme-scale computational science (SPACE)*, DOE, 2017.

J. Brown (PI), *Benchmarks of Realistic Scientific Application Performance of Large-Scale Computing Systems*, NSF, 2015.

K. Jansen (PI), J. Brown, J. Evans, M. Shephard, C. Smith, *Robust and Efficient Unstructured Grid Flow Solvers at Extreme Scale: Extending Existing Success to the Broader Community of Unstructured CFD including FUN3D*, NASA, 2015.

J. Brown (PI), K. Jansen, J. Evans, A. Doostan, *SI2: SSI Modular Software for Model Exploration and Immersive Simulation*, NSF, 2015.

Software

Developer of the Portable Extensible Toolkit for Scientific computing (**PETSc**) since 2008, co-maintainer since 2013, `https://petsc.org`. This involves authoring a few hundred commits/year, mentoring and

reviewing several hundred merge requests, and thousands of emails and other modes of communication to coordinate and support a many-stakeholder international community of over 100 contributors and many thousands of direct and transitive users from academia, research labs, and industry. PETSc makes two feature releases per year, complete with users manual and hundreds of tutorial examples. The library plus examples contain about one million lines of code (mostly C), and disseminates the applied knowledge of hundreds of journal papers as well as unpublished experience.

Principal author and maintainer of **libCEED**: Code for Efficient Extensible Discretization, `https://libceed.org`. I conceptualized and started libCEED in 2017 and have continued to develop and maintain it since. It provides the fastest implementation of fundamental finite element operations on CPUs and GPUs from multiple vendors, and is used by several higher level packages including MFEM and PETSc. My role involves authoring commits, mentoring several of the most active contributors (many within our research group), reviewing/mentoring merge requests, engaging in frequent design and requirements discussions, and growing the community of 30 developers from about 10 institutions as well as a growing user base. The project is currently about 130 thousand lines of code (mostly C/C++, plus Python, Rust, and Julia interfaces).

Maintainer of **Ratel** `https://ratel.micromorph.org`, an efficient and performance-portable solver for nonlinear mechanics leveraging technologies such as matrix-free p-multigrid to provide substantial efficiency and capability advances to industrial state of practice.

Maintainer of the Rust MPI library `https://github.com/rsmpi/rsmpi`.

Principal author of the Parallel Ice Sheet Model (**PISM**) 2004–2007, `https://pism.io`. This model broke new ground in parallel scalability and performance, continues to be actively developed (though I am no longer an active contributor), has received contributions from about 20 researchers, and sustains an active community with at least 159 publications to date. I occasionally advise the current maintainers.

Author of the Dual-Order hp finite element library, `https://github.com/jedbrown/dohp`.

I have released and maintained software written in C, C++, Rust, Julia, Fortran, Python, Haskell, Perl, Ruby, and LaTeX, and have a working knowledge of several other languages including Lisps and x86 and PowerPC assembly.

Selected Presentations

Different conferences have different conventions and terminology, sometimes used ambiguously. For consistency, I use the term "invited" when advertised as such in the conference schedule and *the conference pays expenses. I use "plenary" if in addition, the conference normally has parallel sessions, but my talk was in a plenary session. For conferences without parallel sessions, I just use "invited".*

2023

J. Brown, *Conjectures in economics for fluids and structures*, CEED Annual Meeting, LLNL, 2023-08-01.

J. Brown, *Scalable computational mechanics with Rust*, Scientific Computing in Rust (virtual), 2023-07-14.

J. Brown, *Performance-portable solvers for nonlinear mechanics*, SIAM CSE, Amsterdam, Netherlands, 2023-03-03.

J. Brown, *The new finite element economy in fluids and structures*, UT Austin (invited), 2023-01-31.

2021

J. Brown, *Tactics for Amortizing Latency and Bandwidth via Implicit Time Integration*, SIAM CSE (virtual), 2021-03-03.

J. Brown, *First-class data products for inference*, Land Ice Working Group, CESM Winter Meeting (virtual), 2021-02-04.

2020

J. Brown, *Libraries, communities, and performance portability*, King Abdullah University of Science and Technology, Saudi Arabia (virtual), 2020-09-20.

J. Brown, *CEED Software Thrust*, CEED Annual Meeting (virtual), 2020-08-12.

J. Brown, *Libraries, communities, and performance portability*, (invited), ExCALIBUR: Exascale Computing for System-Level Engineering, UK (virtual), 2020-07-14.

2019

J. Brown, *A Pareto Approach to Capability*, DOE ASCR Advisory Committee Exascale Transition Workshop, Washington, DC, 2019-10-24.

J. Brown, *Developing a terrestrial dynamical core for E3SM*, Multicore-9, NCAR, Boulder, 2019-09-26.

J. Brown, *Algorithms, architectures, and community for high-resolution climate modeling* (invited), Latsis Symposium, ETH Zürich, Switzerland, 2019-08-22.

J. Brown, *On Time Integration for Strong Scalability*, Laboratory of Advanced Numerical Software, Argonne National Laboratory, IL, 2029-07-17.

J. Brown, *On Time Integration for Strong Scalability*, PETSc User Meeting, Atlanta, GA, 2029-06-06.

J. Brown, *JOSS: The Journal of Open Source Software* (plenary), CSDMS Annual Meeting, Boulder, CO, 2019-05-21.

J. Brown, *Early Career Panel* (invited panelist), SIAM CSE, Spokane, WA, 2019-02-25.

J. Brown, *Library interface design and performance portability*, SIAM CSE, Spokane, WA, 2019-02-25.

2018

J. Brown, *On performance portability for unstructured high-order finite element computations*, SIAM Annual Meeting, Portland, OR, 2018-07-09.

J. Brown, *Active learning for cost-aware model reduction*, Copper Mountain Conference on Iterative Methods, Colorado, 2018-03-27.

2017

J. Brown, *Practical and Efficient Time Integration and Kronecker Product Solvers*, SIAM Central States Section, Fort Collins, CO, 2017-09-30.

J. Brown, *Center for Efficient Exascale Discretization, Multicore 7 Workshop* (invited), NCAR, Boulder, CO, 2017-09-28.

J. Brown, *Practical and Efficient Time Integration and Kronecker Product Solvers*, Preconditioning 2017 (invited/plenary), Vancouver, Canada, 2017-08-01.

J. Brown, *PETSc Solvers Tutorial*, PETSc User Meeting, Boulder, CO, 2017-06-14.

J. Brown, *On nonlinear adaptivity with heterogeneity*, Copper Mountain Multigrid Conference, Colorado, 2017-03-30.

J. Brown, *Community building through software design* (plenary), SI2 Meeting, 2017-02-21.

J. Brown, *On nonlinear adaptivity with heterogeneity* (plenary), DD24, Svalbard, 2017-02-09.

2016

J. Brown, *Design Considerations for Latency and Throughput on KNL*, MultiCore 6 Workshop, NCAR, 2016-09-14.

J. Brown, *Higher Standards on the Control of Numerical Accuracy*, AXICCS, Rockville, MD, 2016-09-12.

J. Brown, *Threading Tradeoffs in Domain Decomposition*, SIAM Parallel Processing, Paris, 2016-04-13.

J. Brown, *Building a Community Model for Robustness and Extensibility*, (invited), Melt in the Mantle, Isaac Newton Institute, Cambridge University, 2016-03-03.

J. Brown, *PETSc: Technical and Social Aspects of Library Development*, (invited), Scientific Software Days, UT Austin, 2016-02-25.

J. Brown, *High-Performance Geometric Multigrid (HPGMG) and Quantification of Performance Versatility*, CISL Seminar, NCAR, Boulder, 2016-02-17.

2015

J. Brown, *To Thread or Not To Thread*, Multi-core 5 Workshop, NCAR, Boulder, 2015-09-16.

J. Brown, *Tradeoffs in Data Assimilation and Solver Design*, 14th International Workshop on Modeling of Mantle and Lithosphere Dynamics (invited), Olérons, France, 2015-09-01.

J. Brown, *In Search of Performance Versatility*, PADAL Workshop, Berkeley Lab, 2015-06-24.

J. Brown, *HPGMG: Relevant Benchmarking for Scientific Computing*, HPCSE (invited), Czech Republic, 2015-05-25.

J. Brown, M. Adams, S. Williams, *HPGMG: Benchmarking Computers Using Multigrid*, Copper Mountain Conference on Multigrid Methods, 2015-03-24.

J. Brown, *Time Integration for Atmospheric Physics*, SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake City, 2015-03-16.

J. Brown, *On Adaptive Methods in Heterogeneous Media*, High Performance and Parallel Computing for Materials Defects and Multiphase Flows (invited), National University of Singapore, 2015-02-13.

J. Brown, *Practical Multigrid Methods for Momentum Balance in Ice Sheets*, CESM Land Ice Working Group, NCAR, 2015-02-02.

2014

J. Brown, *How Can We Quantify Performance Versatility?*, JointLab Workshop, Chicago, 2014-11-24.

J. Brown, D. May, L. Le Pourhiet, *pTatin3d: High-performance Methods for Long-Term Lithospheric Dynamics*, SC14, New Orleans, 2014-11-18.

J. Brown, *Software Design and Packaging for Extensibility, Provenance, and Sharing*, CIG Webinar, 2014-11-13.

J. Brown, D. Ghosh, *Can Implicit Integrators Have Less Data Motion Than Explicit?*, $[HPC]^3$ Workshop (invited), KAUST, Saudi Arabia, 2014-11-10.

J. Brown, *Efficient Implicitness: Latency-throughput and cache-vectorization tradeoffs*, Heterogeneous Multi-Core Workshop, NCAR, 2014-09-17.

J. Brown, M. Adams, M. Knepley, D. May, *Towards τ adaptivity for lithospheric dynamics*, SIAM Annual Meeting, Chicago, 2014-07-07.

J. Brown, M. Adams, M. Knepley, *Algorithmic reuse for non-smooth problems in heterogenous media*, Parallel Matrix Algorithms and Applications, Lugano, Switzerland, 2014-07-02.

J. Brown, M. Adams, M. Knepley, *Next-generation multigridding: Adaptivity and communication avoidance*, JointLab Workshop, INRIA Sophia Antipolis, 2014-06-09.

J. Brown, D. May, M. Knepley, *High-performance matrix-free operator application and preconditioning*, Algorithms and Abstractions for Assembly in PDE codes (invited), Sandia National Lab, 2014-05-14.

J. Brown, M. Adams, M. Knepley, *Next-generation multigridding*, SUNY Buffalo, 2014-04-23.

J. Brown, *Numerical libraries and frameworks*, ENES Workshop on Exascale Technologies (invited), Hamburg, 2014-03-18.

J. Brown, *Exploits in implicitness*, SIAM conference on Parallel Processing (SIAG/SC Junior Scientist Prize talk), 2014-02-21.

J. Brown, M. Adams, M. Knepley, *Low-communication multigrid, with applications to time-dependent adjoints, in-situ visualization, and resilience*, SIAM conference on Parallel Processing, 2014-02-19.

J. Brown, *Multigrid on the outside: restructuring time integration and adaptivity*, ANAG seminar, Berkeley National Lab, 2014-01-16.

2013

J. Brown, D. Ghosh, *Fast solvers for implicit Runge-Kutta systems*, JointLab workshop, UIUC, 2013-11-26.

J. Brown, M. Adams, P. Brune, E. Constantinescu, M. Knepley, D. May, B. Smith, *Prospects for next-generation multigridding*, Imperial College London, 2013-09-26 and University of Oxford, 2013-09-27.

J. Brown, *Inverse problems and uncertainty quantification*, Citcom workshop (invited), UC Davis, 2013-09-16.

J. Brown, P. Brune, E. Constantinescu, D. Ghosh, L.C. McInnes, *PETSc and BOUT++*, 2013 BOUT++ workshop (invited), LLNL, 2013-09-04.

J. Brown and S. Dalton, *GPU-accelerated smoothed aggregation algebraic multigrid: Multi-node scalability and versatility*, GPU-SMP13 (invited), Changchun, China, 2013-07-30.

J. Brown, *Vectorization, communication aggregation, and reuse in stochastic and temporal dimensions*, JointLab workshop, Lyon, France, 2013-06-13.

J. Brown and P. Brune, *Low-rank Quasi-Newton Updates for Robust Jacobian Lagging in Newton Methods*, International Conference for Numerical and Mathematics and Computational Methods Applied to Nuclear Science and Engineering (MC2013), Sun Valley, ID, 2013-05-08.

J. Brown, *Discretization, Solvers, and Statistics in Computational Geodynamics*, EarthCube Modeling Workshop (invited), Boulder, CO, 2013-04-23.

J. Brown, S. Abhyankar, B. Smith, *Sharing Thread Pools and Caches for Inter-library Composition and Multicore Performance*, SIAM CSE, Boston, MA, 2013-02-25 to 03-01.

J. Brown, M. Adams, P. Brune, M. Knepley, and B. Smith, *Communication elimination and fault tolerance in multilevel solvers*, Computer Science seminar, UIUC, 2013-02-06.

2012

J. Brown, M. Adams, M. Knepley, and B. Smith, *Multilevel solvers with adaptive coarse space construction for lithosphere dynamics*, 1st International Conference on Frontiers in Computational Physics: Modeling the Earth System, Boulder, CO, 2012-12-16 to 20.

J. Brown, *Pervasive multiscale modeling, analysis, and solvers*, Bridging the Gap Between the Geosciences and Mathematics, Statistics, and Computer Science (invited), Princeton, October 1-2, 2012.

J. Brown, *Multilevel Stokes flow solvers: Adapting to heterogeneity and rheology*, Mantle Convection and Lithospheric Dynamics Workshop (invited), UC Davis, July 30, 2012.

J. Brown, M. Adams, P. Brune, M. Knepley, L.C. McInnes, and B. Smith, *Composable multilevel methods for multiphysics simulation*, SIAM Annual Meeting, Minneapolis, 2012-07-13.

J. Brown, I. Grindeanu, B. Smith, and T. Tautges, *A parallel unstructured implicit 3D polythermal model for outlet glaciers*, International Glaciology Society International Symposium, Fairbanks, AK, 2012-06-28.

J. Brown, P. Brune, E. Constantinescu, M. Knepley, and B. Smith, *Towards high throughput composable multilevel solvers for implicit multiphysics simulation*, National Renewable Energy Laboratory, Golden, CO, 2012-04-27.

J. Brown, M. Knepley, D. May, and B.F. Smith, *Scalable and composable implicit solvers for polythermal ice flow with steep topography*, International Conference on Scientific Computing and Applications, Las Vegas, 2012-04-03.

J. Brown, M. Adams, P. Brune, M. Knepley, D. May, L. C. McInnes, and B.F. Smith, *Commuting block preconditioning with multigrid*, Copper Mountain Conference on Iterative Methods, 2012-03-27.

J. Brown, M. Knepley, D. May, and B.F. Smith, *Towards high throughput composable multilevel solvers for implicit multiphysics simulation*, Center for Computational Engineering Distinguished Speaker Series, MIT, 2012-03-21.

J. Brown, M. Knepley, D. May, and B. Smith, *Towards algorithmic and software composability for implicit multiphysics with high throughput*, ICES/PECOS seminar, UT Austin, 2012-02-23

J. Brown, M. Knepley, D. May, and B. Smith, *Commuting block preconditioned splitting with multigrid within the same code base*, SIAM conference on Parallel Processing, 2012-02-17.

J. Brown, A. Ahmadia, M. Knepley, and B. Smith, *Utilizing emerging multicore and GPU hardware for multiphysics simulation through implicit high-order finite element methods with tensor product structure*, SIAM conference on Parallel Processing, 2012-02-15.

J. Brown, M. Adams, P. Brune, M. Knepley, D. May, and B. Smith, *Toward less synchronous composable multilevel methods for implicit multiphysics simulation*, Workshop on High Performance Computing, and Hybrid Programming Concepts for Hyperbolic PDE Codes $[HPC]^3$ (invited), KAUST, Saudi Arabia, 2012-02-06.

J. Brown, M. Adams, P. Brune, M. Knepley, and B.F. Smith, *Toward less synchronous composable multilevel methods for implicit multiphysics simulation*, Workshop on Synchronization-reducing and Communication-reducing Algorithms and Programming Models for Large-scale Simulations (invited), ICERM, Brown University, 2012-01-10.

2011

D. May, L. Le Pourhiet, and J. Brown, *Tightly coupled geodynamic systems: Software, implicit solvers, and applications*, American Geophysical Union Fall Meeting (invited), 2011-12-05.

J. Brown, A. Ahmadia, M. Knepley, and B.F. Smith, *Utilizing emerging hardware for multiphysics simulation through implicit high-order finite element methods with tensor product structure*, American Geophysical Union Fall Meeting (invited), 2011-12-05.

J. Brown, E. Constantinescu, and B. Smith, *Tightly coupled solvers, loosely coupled software: Multi-physics solvers and time integration in PETSc*, Los Alamos National Laboratory, Center for Nonlinear Studies, 2011-11-02.

J. Brown, I. Grindeanu, D. Karpeev, B.F. Smith, and T.J. Tautges, *Interactive transient and steady-state analysis of regional ice flow*, World Climate Research Programme, Denver, CO, 2011-10-26.

J. Brown, D. May, and B.F. Smith, *Strongly coupled solvers with loosely coupled software*, 7th International

Congress on Industrial and Applied Mathematics - ICIAM 2011, Vancouver, Canada, 2011-07-21.

J. Brown, I. Grindeanu, D. Karpeev, B.F. Smith, and T.J. Tautges, *Scalable implicit methods for free surface flows in glaciology*, 7th International Congress on Industrial and Applied Mathematics - ICIAM, Vancouver, Canada, 2011-07-20.

A. Ahmadia, J. Brown, N. Collier, T. Malas, and J. Gunnels, *A software framework in Python for generating optimal isogeometric kernels on the PowerPC 450*, SciPy, Austin, 2011-07-13.

J. Brown, *Strongly coupled solvers with weakly coupled software: Modular linear algebra for multi-physics*, Workshop on High Performance Computing and Hybrid Programming Concepts for Hyperbolic PDE Codes (invited), KAUST, Saudi Arabia, 2011-03-27.

J. Brown, *Implicit solution of free surface flows in glaciology*, SIAM Conference on Computational Science and Engineering, Reno, NV, 2011-03-01.

J. Brown, *Computational methods for several models of ice stream flow*, International Conference on the Diversity of Research on Geophysical Environmental Sciences, ETH Zürich, 2011-02-18.

2010

J. Brown, *Solving free surface flows for steady state without time stepping*, American Geophysical Union Fall Meeting, 2010-12-14.

J. Brown, *Implicit discretizations for grounding line dynamics*, CCSM Annual Meeting, Breckenridge, CO, 2010-06-30.

J. Brown, *PETSc: new developments, memory performance, and algorithmic experimentation*, NOTUR (invited), Bergen, Norway, 2010-05-21.

J. Brown, *Implicit integration of 3D ice sheet flow using hybrid factorization/relaxation block preconditioning*, Copper Mountain Conference on Iterative Methods (invited), CO, 2010-04-08.

J. Brown, *Scalable solvers for the 3D non-Newtonian Stokes problem in ice flow modeling*, CCSM Annual Meeting, Breckenridge, CO, 2010-06-17.

J. Brown and B.F. Smith, *Textbook multigrid efficiency for hydrostatic ice flow*, CCSM Land Ice Working Group, Boulder, CO, 2010-02-17.

Internal Professional Activities

CS Associate Chair for Inclusive Excellence 2022–

CEAS Inclusive Culture Council 2022–

CEAS Engagement Action Planning Team 2023–

CU Representative for Sloan Equity in Graduate Education Consortium 2023–

CS Computational Science & Engineering Search Committee Chair 2023–2024

CS Colloquium Chair 2018–

CS Compute Committee 2020–

CS EdTech Committee 2019–

CS Executive Committee 2015–2017

CS Graduate Committee 2015–2017

CS Search Committee 2015–2016, 2016–2017

CS representative on INSTAAR/CSDMS Search Committee, 2018–2019

CEAS Faculty Inclusive Excellence Team 2016–2017

CEAS Transfer Credit Committee 2017–2018

External Professional Activities

Associate Editor, Journal of Open Source Software, 2018–present.

Associate Editor, Computational Science and Engineering, Springer, 2023–present.

Elected member of the Leadership Council for EarthCube, 2019–2021.

Mentor for Women in HPC, SIAM, SC, Black in AI.

Elected member of the Science Steering Committee for CIG (Computational Infrastructure for Geodynamics), 2011–2014, 2014–2017.

Member of the CIG Computational Science Working Group, 2013–present.

Co-organizer of ESPPRE Earth System Performance, Productivity, Reliability Engineering at NCAR, 2021

Co-organizer of MultiCore 8–10 at NCAR, 2018–2020.

Primary organizer of PETSc 2017 User Meeting, Boulder, CO.

Co-organizer of IMA Hot Topics Workshop: Modelling Waves Impacting Coastal Areas, UMN, Oct 2014.

Associate Editor, SISC Special Section for CSE15 - CSE Software and Big Data in CSE.

Selected technical program committees:

PDESoft2024 PDE Software Frameworks, Cambridge, UK, 2024-07-01 to 03.

Copper2024 Copper Mountain Conference on Iterative and Multigrid Methods, Colorado, 2024-04-14 to 19.

IEEE Cluster 2024 IEEE International Conference on Cluster Computing, Kobe, Japan, 2024-09-24 to 27.

SC23 International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, CO, 2023-11-11 to 17.

SC22 International Conference for High Performance Computing, Networking, Storage and Analysis, Houston, TX, 2022-11-12 to 18.

ICPP22 International Conference on Parallel Processing,

SC21 International Conference for High Performance Computing, Networking, Storage and Analysis, St. Louis, MO, 2021-11-14 to 19.

ICPP21 International Conference on Parallel Processing, Chicago, IL, 2021-08-09 to 12.

SC20 International Conference for High Performance Computing, Networking, Storage and Analysis, Atlanta, GA, 2020-11-17 to 23.

EuroPar'20 International European Conference on Parallel and Distributed Computing, Warsaw, Poland, 2020-08-24 to 28.

SIAM PP20 SIAM Parallel Processing Technical Papers Committee, 2020.

PASC20 ACM/SIGHPC Platform for Advanced Scientific Computing (PASC), ETH Zürich, 2020-06-29 to 2019-07-01.

SC19 International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, CO, 2019-11-17 to 23.

Precon19 International Conference On Preconditioning Techniques For Scientific and Industrial Applications , Minneapolis, MN, 2019-07-01 to 03.

PASC19 ACM/SIGHPC Platform for Advanced Scientific Computing (PASC), ETH Zürich, 2019-06-12 to 14.

PETSc-2019 PETSc User Meeting, Atlanta, Georgia, 2019-06-05 to 07.

SC18 International Conference for High Performance Computing, Networking, Storage and Analysis, Dallas, TX, 2018-11-11 to 16.

PETSc-2018 PETSc User Meeting, London, 2018-06-04 to 06.

SIAM PP18 SIAM Parallel Processing, Tokyo, Japan, 2018-03-07 to 10.

IPDPS17 International Conference for Parallel and Distributed Computing, Salt Lake City, UT, 2017-11-13 to 18.

SC16 International Conference for High Performance Computing, Networking, Storage and Analysis, Salt Lake City, UT, 2016-11-13 to 18.

PDESoft2016 PDE Software Frameworks, Warwick, England, 2016-07-04 to 08.

PETSc-2016 PETSc User Meeting, Vienna, 2016-06-28 to 30.

SC15 International Conference for High Performance Computing, Networking, Storage and Analysis, Austin, TX, 2015-11-15 to 20.

PETSc-2015 PETSc User Meeting, Argonne National Lab, 2015-06-15 to 18.

SC14 International Conference for High Performance Computing, Networking, Storage and Analysis, New Orleans, LA, 2014-11-16 to 21.

ISC'14 International Supercomputing Conference, Leipzig, Germany, 2014-06-22 to 26.

VECPAR2014 11th International Meeting on High-Performance Computing for Computational Science, Eugene, OR, 2014-06-30 to 07-03.

EASC2014 Exascale Applications and Software Challenges, Stockholm, Sweden, 2014-04-02 to 04

SC13 International Conference for High Performance Computing, Networking, Storage and Analysis, Denver, CO, 2013-11-17 to 22.

GPU-SMP2013 International Workshop of GPU and MIC Solutions to Multiscale Problems in Science and Engineering, Changchun, China, 2013-07-29 to 08-02.

MC2013 International Conference for Numerical and Mathematics and Computational Methods Applied to Nuclear Science and Engineering, Sun Valley, ID, 2013-05-06 to 10.

HPC^3 **2012** Workshop on High Performance Computing and Hybrid Programming Concepts for Hyperbolic PDE Codes, KAUST, Saudi Arabia, 2012-02-04 to 08.

Session convener at the American Geophysical Union Fall Meeting, 2009–2019.

Session convener at SIAM CSE 2015, SIAM PP 2016, SIAM CSE 2019, SIAM PP 2020, SIAM CSE 2023.

BoF organizer, SC14, SC15, SC16, SC17.

Contributor to the MPI-3 standard.

Grant reviewer/panelist for DOE and NSF.

Reviewer for ASCR Leadership Computing Challenge (ALCC), Advances in Water Resources, Computational Science and Discovery, EuroMPI, ETH Zürich, Geoscientific Model Development, International Journal of High Performance Computing Applications, IEEE International Parallel and Distributed Processing Symposium, International Conference on Supercomputing, IMUDI, Journal of Computational Physics, Journal of Fluid Mechanics, Journal of Geophysical Research, Journal of Scientific Computing, SIAM Journal on Scientific Computing, SIAM Journal on Numerical Analysis, The Cryosphere, Transactions and Mathematical Software, ACM Transactions on Mathematical Software, SIAM books, Wiley books

Collaborators

Abhyankar, Shrirang (ANL); Adams, Mark (LBNL); Beams, Natalie (UTK); Bisht, Gautam (PNNL); Bueler, Edward (University of Alaska Fairbanks); Calhoun, Donna (Boise State); Constantinescu, Emil (ANL); Dudouit, Yohann (LLNL); Dalcin, Lisandro (KAUST); Fischer, Paul (UIUC/ANL); Ghosh, Debojyoti (LLNL); Dobrev, Veselin (LLNL); Hammond, Glenn (PNNL); Hammond, Jeff (Intel); He, Yunhui (University of Waterloo); Isaac, Tobin (GATech); Jansen, Ken (CU Boulder); Knepley, Matthew (U Buffalo); Kolev, Tzanio (LLNL); MacLachlan, Scott (Memorial University); McInnes, Lois Curfman (ANL); Medina, David (LLNL); Menickelly, Matt (ANL); Mills, Richard (ANL); Min, Misun (ANL); Rupp, Karl (Independent/TU Wien); Samtaney, Ravi (KAUST); Shephard, Mark (RPI); Smith, Barry (ANL); Smith, Cameron (RPI); Terrel, Andy (Fashion Metric, NumFOCUS); Tomov, Stanimire (UTK); Warburton, Tim (Virginia Tech); Wild, Stefan (ANL); Williams, Sam (LBNL); Zampini, Stefano (KAUST); Zhang, Hong (ANL); Zhang, Hong (UIC);

Teaching

CU Boulder CSCI 5636 Numerical Solution of Partial Differential Equations (Fall 2023)

CU Boulder CSCI 3656 Numerical Computation (Spring 2023)

CU Boulder CSCI 5606 Principles of Numerical Computation (Spring 2023)

CU Boulder CSCI 5636 Numerical Solution of Partial Differential Equations (Fall 2022)

CU Boulder CSCI 3656 Numerical Computation (Spring 2022)

CU Boulder CSCI 5636 Numerical Solution of Partial Differential Equations (Fall 2021)

CU Boulder CSCI 3656 Numerical Computation (Spring 2021)

CU Boulder CSCI 3656 Numerical Computation (Spring 2020)

CU Boulder CSCI 4576/5576 High-Performance Scientific Computing (Fall 2019)

CU Boulder CSCI 3656 Numerical Computation (Spring 2019)

CU Boulder CSCI 5636 Numerical Solution of Partial Differential Equations (Fall 2018)

CU Boulder CSCI 3656 Numerical Computation (Spring 2018)

CU Boulder CSCI 5636 Numerical Solution of Partial Differential Equations (Fall 2017)

CU Boulder CSCI 4830/7000 High-Performance Linear Algebra (Spring 2017)

CU Boulder CSCI 3656 Numerical Computation (Fall 2016)

CU Boulder CSCI 7000-014 Topics in CS&E (Fall 2015)

CU Boulder CSCI 4830-014/7000-018 HPC Performance Analysis (Spring 2015)

Founding member of `scicomp.stackexchange.com`, profile at `http://scicomp.stackexchange.com/users/119/jed-brown`

Thousands of technical explanations of numerical methods and software design in support of hundreds of scientific and engineering applications (many on PETSc mailing lists and externally).

Mentor for PyLith Hackathon, virtual, 2021-06-07 to 16.

Mentor for NASA team at GPU Hackathon, Boulder 2018-06-04 to 08

Tutorials and short courses

Introduction to PETSc, tutorial at SIAM CSE19, Spokane, WA, 2019-02-26.

PETSc Tutorial, tutorial at Memorial University of Newfoundland, Canada, 2017-05-29 to 31.

PETSc Tutorial, tutorial at IT4I, Ostrava, Czech Republic, 2015-05-21 to 22.

Intro to parallel algebraic solvers using PETSc, tutorial at UC Merced, 2014-10-31.

PETSc, tutorial at SUNY Buffalo (with Matt Knepley), 2014-04-22.

PETSc, tutorial at PRACE summer school, Ostrava, Czech Republic, 2013-06-17 to 21.

High performance implicit solvers for geodynamics, CIG Webinar, 2013-01-10.

PETSc, tutorial at National Renewable Energy Laboratory, Golden, CO, 2012-04-27.

Advanced PETSc, tutorial at TACC, Austin, TX, 2012-02-20.

PETSc tutorial at the 2011 ACTS workshop, NERSC, Berkeley, CA, 2011-08-17.

PETSc, 3-day tutorial at the Arctic Region Supercomputing Center, Fairbanks, AK, 2010-08-03 to 05.

PETSc, 2-day tutorial at the Swiss National Supercomputing Center, Manno, Switzerland, 2010-05-10 to 11.

Scalable solvers for nonlinear equations: mini-course on Newton-Krylov methods, 3-week mini-course at the University of Alaska Fairbanks, 2009-01-22 to 02-05, `59A2.org/newton-krylov`.

Two days of hands-on with students at ATPESC, plus panel discussion, 2014-08-08 to 09.

Two days of hands-on with students at ATPESC, plus panel discussion, 2015-08-07 to 2014-08-08.

Software carpentry boot camp, University of Chicago, 2013-01-12 to 13.

Advising

CU Boulder research associates advised

Jeremy Thompson, 2021–

Fabio Di Gioacchino, 2022–

Adeleke Bankole, 2021–2023

Valeria Barra, 2018–2020, RSE at Caltech, Assistant Professor at SDSU

CU Boulder PhD students graduated under my supervision

Dmitry Duplyakin, CS PhD Spring 2017, postdoc at University of Utah, now NREL. Thesis: *Optimizing computations and allocations on high performance and cloud computing systems*.

Tristan Konolige, CS PhD Spring 2020, OctoML. Thesis: *Parallel graph Laplacian and bundle adjustment solvers*

Jeremy Thompson, APPM PhD Summer 2021. Thesis: *Local Fourier Analysis of domain decomposition and multigrid methods for high-order matrix-free finite elements*

CU Boulder PhD students advised

Rey Koki, CS PhD student, SIGHPC/Intel Computational and Data Science Fellow, 2018–

Leila Ghaffari, CS PhD student, 2019–

John Michael McCabe, CS PhD student, 2019–

Rezgar Shakeri, CEAE PhD student, 2020–

Ren Stengel, CS PhD student, 2020–

Corey Murphey, CS PhD student, 2021–

Zachary Atkins, CS PhD student, 2022–

Sarah Gage, CS PhD student, 2017–2019

Arash Mehraban, CS PhD student, 2015–2017

CU Boulder MS students advised

Constance Delannoy, APPM, MS 2022. Thesis: *Applying Neural Networks for Avalanche Detection from Satellite Imagery*

Emily Jakobs, APPM, MS Spring 2021. Thesis: *The Constitutive Relation Inference Toolkit: A semi-automated framework for inverse problems in materials science*

Parth Thakkar, APPM MS student, 2018–2019

Tiantian Xie, MS Spring 2017

Karthik Handady, MS Spring 2017

CU Boulder BS+MS students advised

Matthew Normile, Aerospace BS+MS, 2017–2019

CU Boulder BS Senior Thesis students advised

Mehmet Karaoglu, 2018–2019

CU Boulder Undergraduate research

Evan Gassiot, Mechanical Engineering, 2023–.

Clil Phillips, Mechanical Engineering, 2023.

Alexander Pedersen, CS, 2022.

Kellen Martin, Aerospace Engineering, 2022.

Zack Jorquera, CS, 2021

Devon Quispe, CS, 2021

David Reeder, CS, 2021

Emily Jakobs, APPM, 2019–2020

Raya Alotaibi, CS, 2019–2020

Olivia Golden, MCEN, 2020–2020

Joe Geisz, APPM, 2019

CU Boulder Thesis Committees

Rileigh Bandy, Computer Science PhD

Teo Price-Broncucia, Computer Science PhD

Connor Morency, Aerospace Engineering PhD

Huilan Han, Computer Science MS 2023

Evariste Somé, Computer Science PhD 2023

Adam Christopherson, Aerospace Engineering PhD

Mohammad Mokhtarzadeh Khanegahi, Aerospace Engineering PhD

Amin Taziny, Aerospace Engineering PhD

Joseph Pointer, Aerospace Engineering PhD

James Wright III, Aerospace Engineering PhD

Aviral Prakash, Aerospace Engineering PhD 2023

Fortino Garcia, APPM PhD

Jingwei Li, CS PhD 2023

Sebastian Laudenschlager, CS PhD 2021

Arash Mehraban, CS PhD 2021

Mike Kasper, CS PhD 2020

Hilary Egan, APS PhD 2019

Andrew Glaws, CS PhD 2018, NREL postdoc

James Folberth, APPM PhD 2018

James Balasalle, CS PhD 2018, Digital Globe

Joshua Murphy, CS PhD 2018

Blake Caldwell, CS PhD 2017–2018

Fande Kong, CS PhD 2016, INL staff member

Thomas Nelson, CS PhD 2015

Rain Lambek, CS Senior Thesis

H. Nihar Nandan, CS Senior Thesis

External Examiner for PhD Dissertations

Peter Münch, Chair for High-Performance Scientific Computing, Institute of Mathematics, University of Augsberg.

Argonne summer students advised/co-advised:

2013

Steven Dalton, UIUC PhD, GPU-accelerated distributed-memory parallel algebraic multigrid. (Also served on Steven's thesis committee.)

Jesse Lopez, CSGF, OHSU PhD, performance optimization, multilevel solvers, and discretization for estuary simulation.

Matthew Otten, IIT, "Scientific Application Web server" for monitoring and steering simulations.

Patrick Sanan, Caltech PhD, adaptive HMM and FLAVORS multiscale and variational time integrators in PETSc.

2012

Lulu Liu, KAUST PhD , nonlinear solution methods for oil extraction problems.

Abraham Taicher, UT Austin PhD, compatible discretizations for Darcy-Stokes melt-migration.

Xuan Zhou, IIT PhD, scalable dense linear support in PETSc using Elemental.

Memberships

SIAM Society of Industrial and Applied Mathematics

AWM Association for Women in Mathematics

NAM National Association of Mathematicians

AGU American Geophysical Union

SIGHPC ACM Special Interest Group on High Performance Computing

CMG++ Consortium for Mathematics in the Geosciences