Jeremy L Thompson

Research Software Engineer

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Education

- 2021 **PhD**, University of Colorado Boulder, Applied Mathematics
- 2012 MSc, University of Washington, Applied Mathematics
- 2009 BS, United States Air Force Academy, Mathematics

Experience

- 2021 Research Software Engineer, University of Colorado Boulder PSAAP Center
 - O Architect for solid mechanics library with PETSc and libCEED gitlab.com/micromorph/Ratel
 - O Lead developer for performance portable HPC library github.com/CEED/libCEED
 - Maintainer for fluid dynamics library with PETSc and libCEED gitlab.com/phypid/HONEE
 - O Mentor graduate students; teach software development and academic research practices
 - O Quality focused; improve maintainability and documentation while expanding core functionality
 - O Research software innovation; developed GPU matrix-free Material Point Method software
- 2023 **Demo Team Agent**, Catalyst Game Labs, Colorado BattleTech
 - O Ensuring safe and welcoming environment for introducing new players to miniatures hobbies
 - Organizing statewide events and moderating community spaces for Colorado BattleTech
 - O Editor and developer for original fan campaign system outworlds-wastes.jeremylt.org
- 2017 2021 Graduate Research Assistant, University of Colorado Boulder
 - o libCEED core developer C99 library with CPU/GPU performance portability; optimized AVX, CUDA, & HIP backends; C/C++, Fortran77, Rust, Julia, & Python interfaces
 - O Architect/developer for FEM analysis toolkit github.com/jeremylt/LFAToolkit.jl
 - O Research efficient implementations of high order finite elements for new exascale hardware
 - Develop Local Fourier Analysis toolkit for sharp convergence estimates of preconditioners for arbitrary order finite element based operators, including p-multigrid and BDDC
- 2012 2016 Assistant Professor, United States Air Force Academy
 - O Taught Calc I/II/III, Differential Equations, Engineering Mathematics, Discrete Mathematics
 - O Math majors coordinator; ensure 50+ students in majors on track, organized majors events
 - O Research mentor; advised students for independent research in math and operations research
 - Faculty club advisor, Cadet Honor Guard and Freethinkers club; mentor student leaders, coordinate club travel and budget, monitor chemical and explosive safety programs
- Summer 2014 Visiting Scientist, Lawrence Livermore National Laboratory
 - O Improved wind forecasting data projections for optimizing power grid production balancing
 - Investigated and compared smoothing filters, FFT, Gaussian smoothing, and non-local means
 - 2009 2012 Advanced Weapon Systems Analyst, United States Air Force
 - O NUCWSEP tester and analyst; conducted live tests of B-52 Air Launched Cruise Missile
 - O Aggregated and analyzed ACC nuclear weapon testing results for annual planning report
 - Overhauled annual accuracy and reliability forecasts; restored USSTRATCOM confidence

Honors and Awards

- 2020 2023 Annual freeCodeCamp Top Contributor Award, freeCodeCamp
 - 2018 Helping Hands Volunteer Award, Moving to End Sexual Assault
 - 2016 Brigadier General Daniel W Litwhiler Award for Outstanding Course Director, USAFA Department of Mathematical Sciences
 - 2014 Outstanding Academy Educator, USAFA Department of Mathematical Sciences
 - 2013 Outstanding New Instructor, USAFA Department of Mathematical Sciences
 - 2011 Junior Military Scientist of the Year, USAF Air Combat Command
 - 2010 Honor Graduate, Operations Research Systems Analysis Military Application Course
 - 2008 Excellence in Student Exposition and Research, American Mathematical Society

Selected Publications

- [1] 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. *Journal of Open Source Software*, 6(63):2945, 2021.
- [2] Tzanio Kolev, Paul Fischer, Misun Min, Jack Dongarra, Jed Brown, Veselin Dobrev, Tim Warburton, Stanimire Tomov, Mark Shephard, Ahmad Abdelfattah, Valeria Barra, Natalie Beams, Jean-Sylvain Camier, Noel Chalmers, Yohann Dudouit, Ali Karakus, Ian Karlin, Stefan Kerkemeier, Yu-Hsiang Lan, and Vladimir Tomov. Efficient exascale discretizations: High-order finite element methods. *The International Journal of High Performance Computing Applications*, 06 2021.
- [3] 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 14th WCCM-ECCOMAS Congress 2020, volume 1400, 2021.
- [4] Rezgar Shakeri, Leila Ghaffari, Jeremy Thompson, and Jed Brown. Stable numerics for finite-strain elasticity. *International Journal for Numerical Methods in Engineering*, page e7563, 2024.
- [5] Jeremy L Thompson. An emperical evaluation of denoising techniques for streaming data. Technical Report LLNL-TR-659435, Lawrence Livermore National Laboratory, August 2014.
- [6] Jeremy L. Thompson, Jed Brown, and Yunhui He. Local fourier analysis of p-multigrid for high-order finite element operators. SIAM Journal on Scientific Computing, 45(3):S351– S370, 2023.
- [7] Jeremy L Thompson, Kurt Herzinger, and Trae Holcomb. The frobenius number of balanced numerical semigroups. *Semigroup Forum*, 94:632–649, 2017.