

# Jeremy L Thompson

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## Research Software Engineer

English (native), German (A2-B1)

### Education

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

### Experience

- 2021 - **Research Software Engineer**, *University of Colorado Boulder PSAAP Center*
  - Architect for solid mechanics library with PETSc and libCEED - [gitlab.com/micromorph/Ratel](https://gitlab.com/micromorph/Ratel)
  - Lead developer for performance portable HPC library - [github.com/CEED/libCEED](https://github.com/CEED/libCEED)
  - Maintainer for fluid dynamics library with PETSc and libCEED - [gitlab.com/phypid/HONEE](https://gitlab.com/phypid/HONEE)
  - Mentor graduate students; teach software development and academic research best practices
  - Quality focused; focus on maintainability and documentation while expanding core functionality
  - Research software innovations; developed GPU matrix-free Material Point Method software
- 2023 - **Community Organizer, Moderator**, *Colorado BattleTech, Catalyst Game Labs*
  - Ensure safe and welcoming environment for introducing new players to miniatures hobbies
  - Organize statewide events and moderate community spaces for CGL and Colorado BattleTech
  - Editor/developer for fan game projects, [outworlds-wastes.jeremylt.org](https://outworlds-wastes.jeremylt.org), [skirmishers.jeremylt.org](https://skirmishers.jeremylt.org)
- 2017 - 2021 **Graduate Research Assistant**, *University of Colorado Boulder*
  - libCEED core developer - C99 library with CPU/GPU performance portability; AVX, CUDA, HIP, & SYCL impl; C/C++, Fortran, Rust, Julia, & Python interfaces - [github.com/CEED/libCEED](https://github.com/CEED/libCEED)
  - Architect/developer for FEM preconditioner analysis toolkit - [github.com/jeremylt/LFAToolkit.jl](https://github.com/jeremylt/LFAToolkit.jl)
  - Researched efficient implementations of high order finite elements for new exascale hardware
  - Developed Local Fourier Analysis toolkit, enabled tuning and sharp convergence estimates of preconditioners for arbitrary order FEM based operators, including p-multigrid and BDDC
- 2012 - 2016 **Instructor, Assistant Professor**, *United States Air Force Academy*
  - Taught Calc I/II/III, Differential Equations, Engineering Mathematics, Discrete Mathematics
  - Math majors coordinator; ensured 50+ students in majors on track, organized majors events
  - Research mentor; advised students for independent research in math and operations projects
  - Faculty club advisor, Cadet Honor Guard and Freethinkers club; mentored student leaders, coordinate club travel and budget, monitor chemical and explosive safety programs
- Summer 2014 **Visiting Scientist**, *Lawrence Livermore National Laboratory*
  - 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*
  - NUCWSEP tester and analyst; conducted live tests of B-52 Air Launched Cruise Missile
  - Aggregated and analyzed ACC aircraft nuclear weapon test results for annual planning report
  - Overhauled annual ALCM accuracy and reliability forecasts; restored USSTRATCOM confidence

### Honors and Awards

- 2020 - 2024 **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*

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## Selected Publications

ORCID: <https://orcid.org/0000-0003-2980-0899>

ResearchGate: <https://www.researchgate.net/profile/Jeremy-Thompson>

Google Scholar: <https://scholar.google.com/citations?user=UCKh6wcAAAAJ>

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- [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] 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.
- [3] Rachel Eaton, Kurt Herzinger, Ian Pierce, and Jeremy Thompson. Numerical semigroups and the game of sylver coinage. *The American Mathematical Monthly*, 127(8):706–715, 2020.
- [4] 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.
- [5] 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.
- [6] Jeremy L Thompson. An emperical evaluation of denoising techniques for streaming data. Technical Report LLNL-TR-659435, Lawrence Livermore National Laboratory, August 2014.
- [7] 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.
- [8] Jeremy L Thompson, Kurt Herzinger, and Trae Holcomb. The frobenius number of balanced numerical semigroups. *Semigroup Forum*, 94:632–649, 2017.