Leila Ghaffari

Curriculum Vitae
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Google Scholar : https://scholar.google.com/citations?user=gW-Ve9sAAAAJ

Education

- **University of Colorado Boulder** — Boulder, CO
  PhD in Computer Science — *Aug. 2019 – Present*
- **Sharif University of Technology** — Tehran, Iran
  M.Sc in Chemical Engineering — *Sep. 2013 – Jan. 2016*
- **University of Tehran** — Tehran, Iran
  B.Sc in Chemical Engineering — *Sep. 2006 – Jan. 2011*

Experience

- **University of Colorado Boulder** — Boulder, CO
  Graduate Research Assistant — *Apr. 2020 - Present*

  Faculty advisor: Jed Brown

  - Investigating generalizations of blocked Krylov methods for Kronecker-type systems. This code will be ported to PETSc (Portable, Extensible Toolkit for Scientific Computation).
  - Exploring the null spaces in singular linear systems with iterative methods. This is an ongoing work in PETSc.
  - Contributing to libCEED, a high order and high performance finite element library.
  - Contributing to Ratel (a new solid mechanics software package built upon libCEED and PETSc) using Enzyme-AD, a high-performance automatic differentiation tool, for developing new material models.

- **University of Colorado Boulder** — Boulder, CO
  Graduate Teaching Assistant — *Aug. 2023 - Present*

  Numerical Computation (CSCI 3656):

  - Designing computational assignments in Julia using nbgrader
  - Holding office hours
  - Grading

- **The National Center for Atmospheric Research (NCAR)** — Boulder, CO
  SIParCS Intern — *May 2021 - Jul. 2021*

  Ported the Shallow Water Model mini-app with DPC++, ran it on an Intel Xeon Skylake CPU and an Intel-Xe GPU with different problem sizes, and studied the performance of the ported code (Performance Portability of Shallow Water Model with DPC++).

Publications

- Jed Brown, Valeria Barra, Natalie Beams, **Leila Ghaffari**, Matthew Knepley, William Moses, Rezgar Shakeri, Karen Stengel, Jeremy L. Thompson, and Junchao Zhang. 2022. Performance Portable Solid Mechanics via Matrix-Free p-Multigrid. doi:10.48550/arXiv.2204.01722
- Jed Brown, Ahmad Abdelfattah, Valeria Barra , Natalie Beams, Jean-Sylvain Camier, Veselin Dobrev, Yohann Dudouit, **Leila Ghaffari**, Tzanio Kolev, David Medina, Will Pazner, Thilina Rathnayake, Jeremy Thompson, Stan Tomov, *libCEED: Fast algebra for high-order element-based discretizations*, Journal of Open Source Software, 6(63), 2945, doi:10.21105/joss.02945

Technical Reports

- Kolev, Tzanio, Fischer, Paul, Abdelfattah, Ahmad, Beams, Natalie, Brown, Jed, Camier, Jean-Sylvain, Carson, Robert, Chalmers, Noel, Dobrev, Veselin, Dudouit, Yohann, **Ghaffari, Leila**, Joshi, Aditya Y., Kerkemeier, Stefan, Lan, Yu-Hsiang, McDougall, Damon, Medina, David, Min, Misun, Mishra, Abhishek, Pazner, Will, Warburton, Tim. (2022). *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for more robust exascale applications.* Zenodo. doi:10.5281/zenodo.6514857

- Kolev, Tzanio, Fischer, Paul, Austin, Anthony P., Barker, Andrew T., Beams, Natalie, Brown, Jed, Camier, Jean-Sylvain, Chalmers, Noel, Dobrev, Veselin, Dudouit, Yohann, **Ghaffari, Leila**, Kerkemeier, Stefan, Lan, Yu-Hsiang, Merzari, Elia, Min, Misun, Pazner, Will, Ratnayaka, Thilina, Shephard, Mark S., Siboni, Morteza H., Warburton, Tim. (2021). *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for large-scale GPU-accelerated simulations.* Zenodo. doi:10.5281/zenodo.4672664

- Abdelfattah A., Barra V., Beams N., Brown J., Camier J. S., Dobrev V., Dudouit Y., **Ghaffari L.**, Kolev T., Medina D., Rathnayake T., Thompson J. L., Tomov S., *libCEED User Manual*, Version 0.7, Zenodo, September 2020. doi:10.5281/zenodo.4302737

Talks

- **SIAM Conference on Computational Science and Engineering** — Amsterdam, The Netherlands
  SIAM-CSE23 — *Feb. 2023*

  Forward-Mode Enzyme in Developing Constitutive Models with Ratel

  Leila Ghaffari, William Moses, Jeremy L Thompson, Karen Stengel, Rezgar Shakeri, and Jed Brown

- **Enzyme Conference 2023** — Boulder, CO
  EnzymeCon 2023 — *Feb. 2023*

  Automatic Differentiation in Solid Mechanics: Interpretation and Composition

  Leila Ghaffari, William Moses, Jeremy L Thompson, Karen Stengel, Rezgar Shakeri, and Jed Brown

- **World and Asian Pacific Congresses on Computational Mechanics** — Online
  WCCM-APCOM 2022 — *Jul. 2022*

  On Performance portability of physical problems using libCEED

  Leila Ghaffari, Valeria Barra, Jeremy Thompson, James Wright, and Jed Brown

- **SIAM Conference on Parallel Processing for Scientific Computing** — Online
  SIAM-PP22 — *Feb. 2022*

  On Portability and Performance Versatility in Nonlinear Solid and Fluid Mechanics Using libCEED and PETSc

  Leila Ghaffari, Jeremy Thompson, Valeria Barra, Rezgar Shakeri, Karen Stengel, and Jed Brown

- **The National Center for Atmospheric Research (NCAR)** — Online
  SIParCS 2021 — *Jul. 2021*

  Performance Portability of Shallow Water Model with DPC++

  Leila Ghanffari and Zephaniah Connell

- **SIAM Conference on Computational Science and Engineering** — Online
  SIAM-CSE21 — *Mar. 2021*

  Advances in LibCEED with Applications to Fluid and Solid Mechanics

  Leila Ghaffari, Jeremy Thompson, Valeria Barra, and Jed Brown

Honors and Awards

- **Student Travel Award ($950)**
  SIAM *Jan. 2023*
- **Clive Baillie Memorial Fellowship ($1200)**
  Computer Science Department at CU Boulder *Oct. 2022*
- **Clive Baillie Memorial Fellowship ($1000)**
  Computer Science Department at CU Boulder *Oct. 2020*

Mentoring Experience

- **Summer Program for Undergraduate Research (SPUR)** Boulder, CO
  University of Colorado Boulder *May 2023 - Aug. 2023*

  Clil Phillips (B. Sc. in Mechanical Engineering, University of Colorado Boulder)
- **Summer Program for Undergraduate Research (SPUR)** Boulder, CO
  University of Colorado Boulder *May 2022 - Aug. 2022*

  Kellen Davis Martin (B. Sc. in Aerospace Engineering, University of Colorado Boulder)
- **Summer Program for Undergraduate Research (SPUR)** Boulder, CO
  University of Colorado Boulder *Jun. 2021 - Aug. 2021*

  David Reeder (B. Sc. in Mechanical Engineering, University of Colorado Boulder)