

Leila Ghaffari

Curriculum Vitae

March 2023

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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 – Jun. 2011*

EXPERIENCE

- **University of Colorado Boulder** Boulder, CO
Graduate Research Assistant *Apr. 2020 - Present*
 - Contributing to fluids with [libCEED](#) and [PETSc](#).
 - Contributing to structures with [Ratel](#) and [Enzyme-AD](#), a high-performance automatic differentiation tool, for developing new material models.
 - Investigating generalizations of blocked Krylov methods for Kronecker-type systems.
- **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++](#)).
- **University of Colorado Boulder** Boulder, CO
Collaborating Researcher *Apr. 2019 - Apr. 2020*

Expanded a Navier-Stokes solver mini-app for compressible gas dynamics in a three-dimensional geometry in libCEED.
- **Universite d'Avignon et des Pays du Vaucluse** Avignon, France
Intern *Jan. 2017 - Jun. 2017*

Developed environmental-friendly chemical processes.
- **Sharif University of Technology** Tehran, Iran
Graduate Research Assistant *Feb. 2014 - Jan. 2016*

Designed a bioreactor for Sulfate reducing processes and studied the experimental consistency of the observations with theory.
- **Tehran Oil Refinery Company** Tehran, Iran
Intern *Jun. 2009 - Sep. 2009*

Studied the Health, Safety and Environment (HSE) management of the Tehran Oil Refinery Company.

TECHNICAL SKILLS

- **Programming Languages:** C, Python, Julia, MATLAB, Scala, R
- **Software and Tools:** Git, Make, Snakemake, Travis CI, Linux Bash, Valgrind, GNU Debugger, L^AT_EX, Abaqus, AutoCAD, SOLIDWORKS, ChemCAD, Aspen HYSYS, Enzyme-AD, Zygote
- **High-Performance Computing:** Intel Advisor, DPC++, MPI, MPI I/O, OpenMP, Slurm

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
- Boublenza I, Lazouni HA, **Ghaffari L**, Ruiz K, Fabiano-Tixier AS, Chemat F, *Influence of roasting on sensory, antioxidant, aromas, and physicochemical properties of carob pod powder (Ceratonia siliqua L.)*, J Food Qual 2017:1-10. doi:10.1155/2017/4193672

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

INVITED TALKS

- **American Physical Society** Las Vegas, Nevada
• *APS March Meeting 2023* Mar. 2023
Scale-Resolving Simulations of Turbulence at Extreme/Exa Scale
Kenneth E Jansen, Jed Brown, John A Evans, Riccardo Balin, James R Wright, and **Leila Ghaffari**
- **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
- **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

CONTRIBUTED TALKS

- **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

POSTERS

- **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
- **Exascale Computing Project Annual Meeting** Online
2021 ECP Annual Meeting Apr. 2021
LibCEED 0.8: Concepts and mini-apps
Valeria Barra, Natalie Beams, Jed Brown, Yohann Dudouit, Leila Ghaffari, Arash Mehraban, Will Pazner, Rezgar Shakeri, and Jeremy Thompson
- **SIAM Conference on Computational Science and Engineering** Online
CSE21 Mar. 2021
LibCEED – The Finite Elements Library without Elements
Valeria Barra, Jeremy Thompson, Leila Ghaffari, and Jed Brown
- **AGU Fall Meeting** Online
AGU2020 Dec. 2020
Efficient implementations for matrix-free solutions of PDEs with libCEED
Valeria Barra, Jed Brown, Jeremy Thompson, Leila Ghaffari, Yohann Dudouit, and Natalie Beams
- **Women in High Performance Computing Summit** Vancouver, Canada
WHPC Apr. 2020
An open-source library for high-performance computing on heterogeneous architectures: libCEED
Valeria Barra, Jed Brown, Yohann Dudouit, Leila Ghaffari, and Jeremy Thompson

HONORS AND AWARDS

- **Student Travel Award (\$950)**

SIAM

Jan. 2023

Awarded from the Society for Industrial and Applied Mathematics (SIAM) to attend the 2023 SIAM Conference on Computational Science and Engineering (CSE23).

- **Clive Baillie Memorial Fellowship (\$1200)**

Computer Science Department at CU Boulder

Oct. 2022

Awarded from the Department of Computer Science at CU Boulder to attend the 2023 SIAM Conference on Computational Science and Engineering (CSE23).

- **Clive Baillie Memorial Fellowship (\$1000)**

Computer Science Department at CU Boulder

Oct. 2020

Awarded from the Department of Computer Science at CU Boulder to attend the 2021 SIAM Conference on Computational Science and Engineering (CSE21).

TEACHING EXPERIENCE

- **University of Tehran**

Tehran, Iran

Process Design with HYSYS

Jan. 2011 - May 2011

Teaching assistant for **Computer Aided Process Design and Simulation with Aspen HYSYS**, a chemical process simulator used to mathematically model chemical processes, at the Chemical Engineering Department.

MENTORING EXPERIENCE

- **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)