Brian M. Howell

numerical optimization   │   *numerical methods*   │   *numerical simulation*

portfolio: https://bmhowell.github.io   **email**: bhowell@berkeley.edu   ∈ **Bay Area, CA**

Summary

I am an engineer interested in high-performance numerical simulation/optimization/linear algebra and its applications in scientific computing, machine learning, finance, and manufacturing. I am battle-hardened in building in-house solvers for PDEs and optimization methods in C/C++/CUDA/Python.

Professional Experience

Apple, Cupertino, CA.   **Feb. 2024 - Present**
Computational Physics Intern:

- *Platform Architecture* - parallel/distributed + high performance computing
- *Software*: Full stack distributed computing via MPI and CUDA, with C++ back end and Python front end.

Google X, the moonshot factory, Mountain View, CA.   **Jan 2022 - Dec 2022**
AI Resident:

- *My project* aimed at bringing modern computing tools for materials optimization to a very large industry. My colleague and I cracked the problem with geometric/thermodynamic + convex modeling/optimization.
- *Machine Learning/Optimization*: Gaussian processes + Bayesian optimization, deep learning, convex optimization
- *Physics Simulation/Modeling*: Discrete element method, convex geometry
- *Hardware*: Sensor development and data processing, high-throughput experimentation, feedback control systems for complex fluid flow
- *Publicly Available Output*: Three granted patents (one as lead inventor)

Lawrence Livermore National Lab., Livermore, CA.   **June 2017 - Jan 2022**
Staff Scientist:

- *My work* at LLNL was primarily focused on materials development & optimization for 3D printing
- *Software/Simulation*: Controllers, sensors, toolpath generation and optimization, digital twins for additive manufacturing
- *Hardware/Chemical*: Hardware integration, CAD modeling & design, chemical formulation
- *Testing*: Rheology & UV kinetics, mechanical (Instron), Scanning Electron Microscope (SEM)
- *Publicly Available Output*: Two patents (one as lead inventor), one publication, work featured in Advanced Science News

UC Berkeley, Berkeley, CA.   **Jan 2021 - Jan 2022**
Graduate Student Instructor:

- *My position* focused on computational modeling that brought applied mathematical techniques in numerical methods, optimization and machine learning to raw, custom code.
- **Head GSI:** Modeling and Simulation of Advanced Manufacturing Processes - Professor Tarek Zohdi
- **Head GSI:** Modeling and Simulation Tools for Industrial Research Applications - Professor Tarek Zohdi
- *Received* 2021 Outstanding GSI Award by the unversity

Skills

Programming Tools: C/C++, Python, CUDA, OpenMP, MPI, PyTorch, JAX, LaTeX, Git, Linux
Computational Methods: Numerical Methods/Optimization/Linear Algebra, Machine Learning, Parallel Computing, Distributed Computing

Education

UC Berkeley
PhD/MS in **Computational/Mechanical Engineering**   **2019–2024**
Dissertation: *Materials Discovery & Optimization for Advanced Manufacturing*
Advisor: *Prof. Tarek Zohdi*

Brigham Young University
BS in **Chemical Engineering**   **2013–2017**