

Education

University of Utah

Expected May 2022

M.S. in Mechanical Engineering – GPA: 4.00

Salt Lake City, UT

- Advisor: Dr. Ashley D. Spear
- Coursework: Continuum Mechanics (TA), Finite Elements, Fracture and Fatigue, Optimization, Parallel Computing HPC, Probability, Data Science, Advanced Finite Elements (Sp. 2022)

University of Utah

May 2021

Honors B.S. in Mechanical Engineering – GPA: 3.98

Salt Lake City, UT

- Honors Ecology and Legacy Minor

Research Experience

University of Utah Multiscale Mechanics & Materials Laboratory

Aug. 2019 - Present

MS/BS Research Assistant

Salt Lake City, UT

Funded by: Department of Energy (DOE) Nuclear Energy University Program (NEUP)

Topic: Estimating macroscale ductility using microstructure-sensitive scaling relationships

- Incorporated continuum damage mechanics into a large strain FFT-based crystal plasticity model and validated model predictions with EBSD and DIC characterizations of microtensile tests
- Developed Python code for numerous research tasks, including a comprehensive Fortran wrapper, a parallelized grain boundary strengthening algorithm, a material parameter optimizer, data analysis and visualization, and numerical methods
- Contributed numerical Eshelby approximation code to the open-source C++ DREAM.3D project with the “Compute Eigenstrains by Feature (Grain/Inclusion)” filter to improve the accessibility of the method
- Extensively worked with several FFT-based crystal plasticity models and codes through incorporating new features, setting up and running simulations, and analyzing and visualizing results
- Leveraged high-performance computing (HPC) for running OpenMP and MPI parallelized codes on a Linux cluster environment using the Slurm workload manager

Los Alamos National Laboratory

May 2021 - Aug. 2021

Graduate Research Assistant

Remote

- Developed a method to model material indentation using a large strain EVPFFT model through formulation and code modifications
- Substantially improved EVPFFT simulation execution time through serial code optimizations, OpenMP parallelization, and external library implementations

Publications

- **C.K. Cocke**, A. Rollett, R. Lebensohn, A. Spear, “The AFRL Additive Manufacturing Modeling Challenge: Predicting Micromechanical Fields in AM IN625 Using an FFT-Based Method with Direct Input from a 3D Microstructural Image,” *Integrating Materials Manufacturing and Innovation*, 2021.
<https://doi.org/10.1007/s40192-021-00211-w>

Conference Presentations (*presenter)

- **C.K. Cocke***, A. Rollett, R. Lebensohn, A. Spear, “The AFRL AM Modeling Challenge: Predicting Micromechanical Fields in AM IN625 Using an FFT-Based Method with Direct Input from a 3D Microstructural Image,” *USNCCM16*, Virtual, July 2021.
- **C.K. Cocke***, A. Rollett, R. Lebensohn, A. Spear, “The AFRL AM Modeling Challenge: Predicting Micromechanical Fields in AM IN625 Using an FFT-based Method with Direct Input from a 3D Microstructural Image,” *3DMS 2021*, Virtual, June 2021.
- A. Rollett*, R. Suter, R. Lim, M. Wilkin, Y. Zhang, P. Promopattum, **C.K. Cocke**, A. Spear, R. Lebensohn, J. Gordon, “Probing Microstructural Evolution in Deformation with Electrons and X-rays,” *TMS 2021*, Virtual, March 2021.

Teaching Experience

- Teaching Assistant: Continuum Mechanics (ME EN 5530/6530) Fall 2021

Professional Experience

Corning

June 2018 - June 2019

Engineering Intern

Salt Lake City, UT

- Reduced automation downtime and improved operator safety of several systems through custom designed (SolidWorks) and machined metal and plastic parts (manual/CNC milling)
- Improved cycle time and enhanced user safety of a testing fixture by redesigning the electronics system and reworking PLC ladder logic

Awards

2021: Winner: ASME/IEEE Heat Sink Design Competition 2021 (1st of 20+ submissions)

2020: Top Performer Award: AFRL Additive Manufacturing (AM) Modeling Challenge #4

2019: Larry DeVries Scholarship: awarded to outstanding mechanical engineering students

2019: Mechanical Engineering Tuition Waiver

2017-2021: Utah Flagship Scholarship

Projects

Heat Sink Design Competition: Team leader for a competition-winning natural convection heat sink designed using Ansys and COMSOL computational fluid dynamics (CFD) software

Keyboard Design: Completely designed and built a custom keyboard number pad from scratch (PCB, electronics, case, code) using KiCad, SolidWorks, Blender, and C

Skills

Programming: Python, Fortran, MATLAB, C++, C

Tools: Git, Linux, Slurm, OpenMP, MPI, CUDA, LaTeX

Software: DREAM.3D, ParaView, ABAQUS, FRANC3D, COMSOL, SolidWorks