Carter K. Cocke

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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. Promoppatum, **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