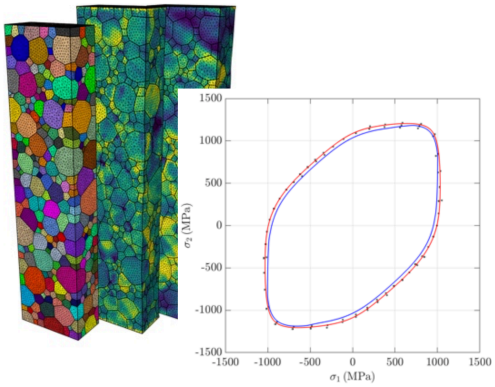
THE UNIVERSITY OF ALABAMA® | College of Engineering

PhD Student in Mechanical Engineering
The University of Alabama

Project Description:

The **anisotropic deformation** response of metallic alloys is determined by the condition of the microstructure (e.g., grain size and shape, crystallographic texture, etc.) and the single crystal response. Simulations of engineering components, however, often do not consider these influences as crystal-scale simulations are computationally costly, and thus isotropic assumptions are generally employed. This project is focused on the development of **reduced-order models** to introduce complex crystal-scale behavior into component-scale simulations at a lower computational cost than crystal-scale simulations. **Machine learning** algorithms are employed to parse through simulated deformation histories of polycrystalline samples in an effort to generate novel yield criteria which are sensitive to microstructure descriptors, which can be directly embedded in component-scale simulations.



Qualifications and Requirements:

Candidates must have completed or be scheduled to complete a BS or MS degree (or equivalent) in an engineering or STEM discipline (e.g., physics, mathematics). Students must be able to begin by **August 15th 2021**.

The candidate must have experience with programming and scripting, primarily in **Python** or **MATLAB**. Special attention will be given to candidates with programming experience in **Fortran** or other similar languages (C, C++, etc.).

Laboratory:

The Advanced Computational Materials Engineering Laboratory (ACME Lab) employs large-scale simulations to model the deformation response of materials in an effort to determine how crystal-scale deformation processes and the microstructure of the materials influence their macroscopic behavior and properties. This is achieved primarily through the use of crystal-scale finite element simulations using the program FEPX. More information can be found at:
ACME Lab: www.acmelab.ua.edu
FEPX: www.fepx.info

Contact:

For more information concerning this project, please contact Dr. Matthew Kasemer directly at email mkasemer@eng.ua.edu, or telephone 814-431-9080.