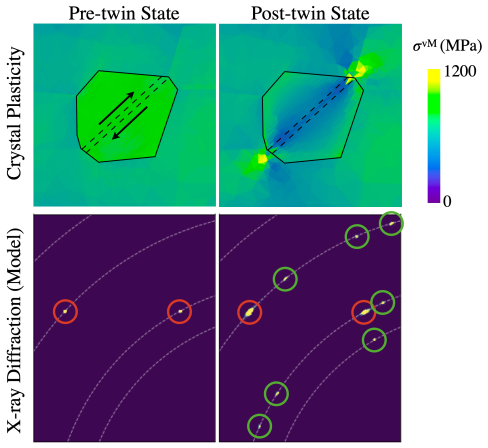
THE UNIVERSITY OF ALABAMA® | College of Engineering

Position: PhD Student
The University of Alabama
Department of Mechanical Engineering

Project Description:

While **deformation twinning** has been observed in many high-strength structural alloys, the mechanisms which govern its behavior are not well understood compared to other plasticity mechanisms (e.g., crystallographic slip). This study aims to formulate a phenomenological model governing the behavior of discrete deformation twinning at the grain scale to provide for better predictive models of the deformation of polycrystalline materials through a correlated experimental-theoretical approach. High energy **X-ray diffraction experiments** will be performed *in situ* to track the evolution of plasticity (specifically the nucleation and evolution of deformation twins) at the grain scale during deformation loading. The analysis of this experimental data will aid in the formulation of a phenomenological model governing the behavior of twinning at the grain scale. This model will be implemented into a novel **crystal plasticity finite element** framework that considers discrete deformation twin regions.



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). The position will begin **August 15th 2022** (at the latest, earlier start-dates are possible).

The candidate must have experience with programming and scripting. Special attention will be given to candidates with programming experience in Fortran or other high-level programming languages (C, C++, etc.).

Laboratory:

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

Contact:

For more information concerning this project, please contact Dr. Matt Kasemer directly at email mkasemer@eng.ua.edu, with subject line "Open PhD Position" and CV (and any other pertinent materials) attached.