

CHEN ZHANG

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I am a computational scientist at the Computer Science and Mathematics Division in Oak Ridge National Laboratory with a research focus in computational micro-mechanics and neutron scattering data reduction. I am proficient with Python, C++, and FORTRAN for processing neutron scattering data as well as using Finite element analysis to perform crystal plasticity simulation.

◇ Python ◇ C++ ◇ Git ◇ diffraction ◇ data visualization ◇ VTK
◇ Cython ◇ FORTRAN ◇ L^AT_EX ◇ FEA ◇ data mining ◇ Paraview

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory

August 2020 – Present

R&D Associate Staff

- Maintaining neutron scattering data reduction software Mantid.
- Maintaining and developing computational toolkit for neutron imaging group at Spallation Neutron Source in Oak Ridge National Laboratory.
- Assisting the data reduction toolkit development for Biological Small-Angle Neutron Scattering Instrument (Bio-SANS) at High Flux Isotope Reactor in Oak Ridge National Laboratory.

Colorado School of Mines & Advanced Photon Source

September 2019 – August 2020

Post-Doctoral Fellow

- Developing semi-automated data processing pipeline for the HT-HEDM instrument located at Advanced Photon Source.
- Participating the development of a Python-based control system that synchronize the experiment control and real time note keeping.
- Developing *x-proc* (tomoproc&hedmproc), a collection of meta-packages to streamline the post processing of tomography, ff-HEDM, and nf-HEDM data, primarily aimed for the HT-HEDM instrument.
- Participating in the deployment of the new HT-HEDM at 6-ID-D at Advanced Photon Source.

Carnegie Mellon University & Advanced Photon Source

September 2018 – August 2019

Postdoctoral Research Associate

- Conducting synchronization analysis of duo-detector configuration for the ff-HEDM experiment with HT-HEDM instrument.
- Leading the development of a modern Python-based experiment control system for the HT-HEDM instrument.
- Developing tomoproc, a Python meta-package for automated tomography reconstruction using data collected with HT-HEDM instrument.
- Participating the development of HEXOMAP, : A GPU-based microstructure reconstruction library for processing nf-HEDM data collected with HT-HEDM instrument
- Conducting tomographic characterization of solid oxide fuel cells using high-energy transmission X-ray microscopy to evaluate the porosity structure of the cathode.

Michigan State University

August 2010 – August 2018

Graduate Research Assistant

- Studying the plastic deformation history of Ti-5Al-2.5Sn (wt%) using crystal plasticity modeling in conjunction with electron backscatter diffraction (EBSD) and differential aperture X-ray microscopy (DAXM)
- Maintaining and developing constitutive models for open-source material analysis toolkit: Düsseldorf Advanced Material Simulation Kit (*DAMASK*)
- Developing Python package *CYXTAL* for materials informatics, including residual lattice stress-strain extraction and dislocation content mapping (in development)

- Developing new algorithm that can provide spatially resolved dislocation density information by analyzing large set of micro-Laue diffraction patterns
- Developing new algorithm for 3D dislocation network reconstruction from 3D electron channeling contrast imaging (ECCI) data using computer vision and machine learning

Michigan State University

August 2010 – April 2017

Teaching Assistant

- Teaching undergraduate students to implement various algorithm using **Matlab** and **Excel**
- Teaching standard experimental techniques for **materials characterization**.

Oak Ridge National Laboratory

February 2013

Visiting Scholar

- Developing computational toolkit for analyzing and visualizing subsurface dislocation content using micro-Laue diffraction data.

Max-Planck-Institut für Eisenforschung GmbH

June 2012

R&D Intern

- Developing 3D microstructure reconstruction algorithm for crystal plasticity simulation using computer vision and data mining.

PUBLICATIONS

- 2019 A. Chakraborty, **C. Zhang**, S. Balachandran, T. Bieler, P. Eisenlohr,
Assessment of surface and bulk-dominated methodologies to measure critical resolved shear stresses in hexagonal materials, *Acta Materialia*
- 2018 **C. Zhang**, T.R. Bieler, P. Eisenlohr,
Exploring the accuracy limits of lattice strain quantification by virtual diffraction, *Scripta Materialia*
- 2018 **C. Zhang**, S. Balachandran, P. Eisenlohr, M.A. Crimp, C. Boehlert, R. Xu, T.R. Bieler
Comparison of dislocation content measured with transmission electron microscopy and micro-Laue diffraction based streak analysis, *Scripta Materialia*
- 2017 M. Diehl, P. Eisenlohr, **C. Zhang**, J. Nastola, P. Shanthraj, F. Roters
A Flexible and Efficient Output File Format for Grain-Scale Multiphysics Simulations, *Integrating Materials and Manufacturing Innovation*
- 2015 **C. Zhang**, H. Li, P. Eisenlohr, W. Liu, C.J. Boehlert, M.A. Crimp, T.R. Bieler
Effect of realistic 3D microstructure in crystal plasticity finite element analysis of polycrystalline Ti-5Al-2.5Sn, *International Journal of Plasticity*
- 2014 T.R. Bieler, P. Eisenlohr, **C. Zhang**, H. Phukan, M.A. Crimp
Grain boundaries and interfaces in slip transfer, *Current Opinion in Solid State and Materials Science*, 2014
- 2010 **C. Zhang**, B. Lv, Y. Wang
Study of sand mold strength in cast magnesium alloy production, *Foundry Engineering*, 2009

EDUCATION

Michigan State University
Materials Science and Engineering, Ph.D.

August 2010 – August 2018

GPA: 3.8/4.0

Shanghai Jiao Tong University
B.S. in Materials Science and Engineering, Minor in Management

2006-2010

GPA: 3.7/4.0

Hohhot No.2 Middle School
N/A

2003-2006

GPA: 3.7/4.0

SCHOLARSHIPS AND AWARDS

Outstanding Graduate Student
College of Engineering, Michigan State University, MI

April 2016

Graduate School Fellowship
Graduate School, Michigan State University, MI

March 2015

Engineering Graduate Study Fellowship
College of Engineering, Michigan State University, MI

Jan. 2015

TECHNICAL SKILLS

Experiments

- Experienced with Finite Element Analysis (**FEA**) based structural analysis in conjunction with **CAD** modeling
- Experienced in **X-ray diffraction** based characterization techniques
- Proficient in **Linux** based system administration
- Proficient in applying **machine learning** technique for big data analysis
- Familiar with modern Electron Backscatter Scanning Microscopy (**EBS**) based crystal orientation characterization
- Familiar with standard mechanical testing (**tensile, hardness, impact**)
- Familiar with additive manufacturing process

Programming

- Experienced in **Python** scripting for fast prototyping, proficient in using **Cython** for developing high performance Python library
- Experienced in using **Fortran** and **C++** for scientific computing, proficient in using **MPI** library to improve code efficiency
- Experienced in **L^AT_EX** typesetting system, proficient in Microsoft Office suite
- Proficient in using **R**, **Matlab** for statistic analysis
- Proficient in using **GNU make** and **Git** for project management
- Familiar with **SQL** based database management

NOTABLE PROJECTS

- ◇ Computer vision based auto-reconstruction of 3D dislocation network using 3D ECCI data
- ◇ An efficient pseudo nonlocal crystal plasticity model for simulating grain boundary effect
- ◇ Non-destructive characterization of dislocation content using micro-Laue diffraction based streak analysis
- ◇ Silver Screen Oracle: box-office prediction using sentiment analysis and public opinion mining
- ◇ Shape Interpolation for seamless transition between source and target shapes using CGAL