

CHEN ZHANG

Github: github.com/KedoKudo ◊ LinkedIn: [linkedin.com/in/chen-z-5a081725](https://www.linkedin.com/in/chen-z-5a081725)

I am a computational scientist at the Computer Science and Mathematics Division in Oak Ridge National Laboratory. My research focuses on neutron data reduction, machine learning, and computational micro-mechanics. I am proficient in Python, C++, and FORTRAN, and I have developed various applications for processing neutron imaging and scattering data. These applications utilize both first-principle models and neural networks.

◊ Python ◊ C++ ◊ Python ◊ Neutron Scattering ◊ GNN ◊ Reinforcement Learning

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory

August 2020 – Present

R&D Associate Staff

- Lead an LDRD project on hybrid graph neural networks, which aims to develop a graph neural network model capable of capturing both the topology and node feature evolution from spatial-temporal graph sequences.
- Lead the development of high-performance data reduction software, *mcpevent2hist*, for processing raw data from Timepix3 chips.
- Maintaining and developing computational toolkit for neutron imaging group at Spallation Neutron Source in Oak Ridge National Laboratory.
- Maintaining neutron scattering data reduction software *Mantid*.
- Developing graph neural networks based reinforcement learning control toolkit for traffic control.

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.

EDUCATION

Michigan State University

August 2010 – August 2018

Materials Science and Engineering, Ph.D.

GPA: 3.8/4.0

Shanghai Jiao Tong University

2006-2010

B.S. in Materials Science and Engineering, Minor in Management

GPA: 3.7/4.0

Hohhot No.2 Middle School

2003-2006

N/A

GPA: 3.7/4.0

SCHOLARSHIPS AND AWARDS

Outstanding Graduate Student

April 2016

College of Engineering, Michigan State University, MI

Graduate School Fellowship

March 2015

Graduate School, Michigan State University, MI

Engineering Graduate Study Fellowship

Jan. 2015

College of Engineering, Michigan State University, MI

SELECTED PUBLICATIONS

- 2023 Brett Eiffert, **C. Zhang**
Usage Pattern Analysis for the Summit Login Nodes, Springer CCIS Communications in Computer and Information Science
- 2022 William T. Heller, John Hetrick, Jean Bilheux, Jose M. Borreguero Calvo, Wei-Ren Chen, Lisa DeBeer-Schmitt, Changwoo Do, Mathieu Doucet, Michael R. Fitzsimmons, William F. Godoy, Garrett E. Granroth, Steven Hahn, Lilin He, Fahima Islam, Jiao Lin, Kenneth C. Littrell, Marshall McDonnell, Jesse McGaha, Peter F. Peterson, Sai Venkatesh Pingali, Shuo Qian, Andrei T. Savici, Yingrui Shang, Christopher B. Stanley, Volker S. Urban, Ross E. Whitfield, **Chen Zhang**, Wenduo Zhou, Jay Jay Billings, Matthew J. Cuneo, Ricardo M. Ferraz Leal, Tianhao Wang, Bin Wu
drtsans: The data reduction toolkit for small-angle neutron scattering at Oak Ridge National Laboratory,, SoftwareX, Volume 19
- 2021 **C. Zhang**, Z. Morgan
Advanced Image Reconstruction for MCPDetector in Event Mode, Springer CCIS Communications in Computer and Information Science
- 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

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 (**EBSD**) 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 \LaTeX 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