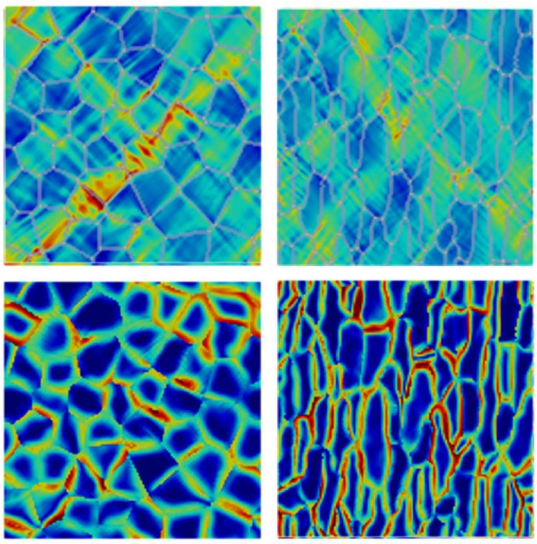
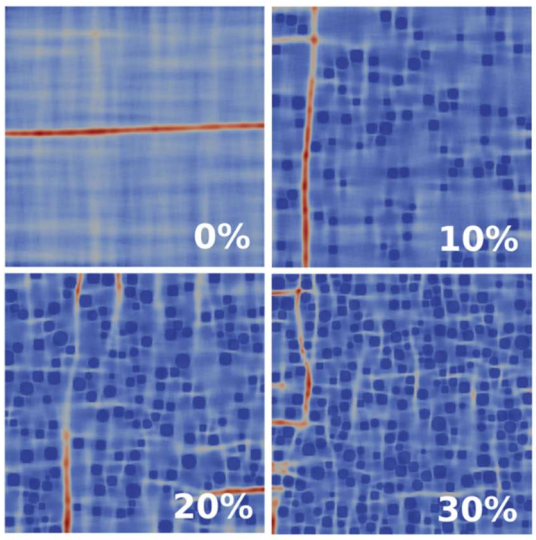
PFMDM 2025

2025 Sino-German Symposium on Phase-Field Modelling of Defect Microstructures and Mechanics

Program





FAU
Friedrich-Alexander-Universität
Erlangen-Nürnberg

WWS

Scope, Date and Venue

The ***Symposium on Phase-Field Modelling of Mechanical Behavior and Defect Microstructures*** **(PFMMD)** is organized within the framework of the Sino-German Mobility project "A unified phase-field approach for interactions between dislocations and other defects", between the Chair of Materials Simulation, FAU Erlangen-Nürnberg, Germany and the Dept. of Materials Science, Northwest Polytechnic University, China.

The mechanical properties of materials are determined by the interactions between point defects (e.g. vacancies and solute atoms), linear defects (e.g. dislocations), planar defects (e.g. grain and phase boundaries) and bulk defects (e.g. voids, precipitates and cracks). Understanding and predicting the coupled evolution of defect microstructure and mechanical fields (stress, strain) during deformation and failure has been a long-standing challenge for the mechanics and materials community. Phase field approaches provide a conceptual foundation for treating defect microstructure and mechanical response in a unified continuum framework. Related challenges include but are not limited to: 1) development of phase-field theories of dislocations and/or crystal plasticity; 2) formulation of damage and fracture models to correctly represent microstructural mechanisms; 3) continuum modelling of long- and short-range interactions between dislocations, grain and phase boundaries, and cracks; 4) physically meaningful formulation of defect energy functionals and related thermodynamic driving forces, and use of multiscale approaches for parameterizing such energy functionals and mobility parameters; 5) robust and numerically efficient implementation of phase field models. Addressing these challenges is the main objective of the above-mentioned Sino-Germany mobility program. With this symposium, the organizers, are looking forward to discuss new ideas and novel methods within, but not limited to, the above topics.

Venue: Hotel Residenzschloss, Bamberg, Germany
Dates: October 9-12, 2025
Participation: There is no participation fee. Travel and accommodation expenses of participants with German or Chinese nationality and/or affiliation can be covered from project funds upon reasonable request.

Technical Program

October 9	Reception & registration
October 10	
9.00-12.00	Dislocation plasticity and dislocation-microstructure interactions I
13.00-15.00	Dislocation plasticity and dislocation-microstructure interactions II
15.30-17.30	Microstructure influences on damage and fracture
October 11	
9.00-12.00	Microstructure influences on damage and fracture
13.00-15.00	Dislocation plasticity and dislocation-microstructure interactions III
15.30-17.30	Numerical aspects
October 12	
9.00-12.00	Multiscale approaches to modeling and parameterization
13.00-15.00	Coupled models of plasticity and failure
15.30	Closing discussion

Organizers

Prof. Dr. Michael Zaiser

Chair Professor of Materials Simulation, Department of Materials Science and Engineering, FAU Erlangen-Nürnberg
michael.zaiser@fau.de

Michael Zaiser is Head of the Institute of Materials Simulation in the Department of Materials Science and Engineering, University of Erlangen-Nuremberg, Germany. He got his Ph.D. in theoretical physics at the Max-Planck-Institut for Metals Research, Stuttgart, Germany. From 2001-2012 he served as professor and head of the Institute for Materials and Processes at the University of Edinburgh. His main research fields include dislocation theory, microstructure-based plasticity modelling, properties and design of metamaterials, deformation and failure of materials with amorphous or disordered microstructures, and data-driven approaches to materials design and property prediction. He is German PI of Sino-German project "A unified phase-field approach for interactions between dislocations and other defects". He has published more than 200 articles in peer-reviewed journals, including Science, Nature Physics, Nature Computational Science, Nature Reviews Physics, Nature Communications.

Prof. Dr. Ronghai Wu

Associate Professor , School of Materials Science and Engineering, Northwestern Polytechnical University, China
ronghai.wu@nwpu.edu.cn

Ronghai Wu is associate professor at the Department of Materials Science and Engineering, Northwestern Polytechnical University in Xi'an, China. He got his Ph.D. in Materials Science and Engineering at the Friedrich-Alexander University of Erlangen-Nuremberg (FAU) in Germany. His primary research focus is on solving scientific and engineering problems related to material deformation, damage, and lifetime prediction using multiscale computational methods, including molecular dynamics, dislocation dynamics, phase field methods, crystal plasticity, and machine learning. He is the Chinese PI of Sino-German project "A unified phase-field approach for interactions between dislocations and other defects". His publications include works in Journal of the Mechanics and Physics of Solids, International Journal of Plasticity, Physical Review B, Scripta Materialia.