YI HU

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Overview

- Capable of solving problems at different scales
- Proficient in extensive simulation tools and codes
- Collaboration in multi-cultural teams
- Enthusiastic about new technologies and tools

Research & Work Experiences

06/2022–present **Research Scientist, Max-Planck-Institut für Nachhaltige Materialien GmbH**
- supervisors: Prof. Franz Roters, Prof. Dierk Raabe
- two *industrial projects* with aluminum companies
- core developer of open-source *crystal plasticity* code *DAMASK*
- develop new *ductile damage models* using phase-field methods
- implement a *variational FFT solver* (at least 30% performance boost)

11/2016–11/2021 **Ph.D. Thesis, Precipitation Strengthening in Al-Mg-Si Alloys, with Prof. W. A. Curtin**
- predict alloy yield strength through *multiscale modeling and theories*
- utilize *Neural Network Potentials* for atomistic simulations (on HPC clusters)
- implement key *atomistic mechanisms* in *mesocale coarse-grained simulations*
- investigate strength of *experimental representative random microstructures*
- establish *predictive models* valuable for material design

06/2018–06/2020 **Teaching Assistant, Solid Mechanics, EPFL Bachelor Course**
- design problem sets, supervise tutorial sessions

09/2017–09/2019 **Research Member, MARVEL (National Center of Competence in Research, Suisse)**
- posters in 2018, 2019, and 2021 of MARVEL annual review, Lausanne

02/2016–07/2016 **Master Thesis, Phase Field Approaches to Topology Optimization**
- supervisor: Prof. Marc-André Keip
- formulate numerical algorithms for topology optimization
- implement phase-field approaches in open-source code
- solve 2D/3D multiphysics problems

10/2015–02/2016 **Student Research Assistant, Homogenization for Multi-field Modeling, Uni Stuttgart**

02/2014–06/2014 **Bachelor Thesis, Damage Simulations of Concrete Tunnel Segment Lining**
- supervisor: Prof. Xiaoying Zhuang

Education

2016–2021 *École Polytechnique Fédérale de Lausanne (EPFL)*, Ph.D. Mechanical Engineering
2014–2016 *Universität Stuttgart*, M.Sc. Simulation Technology, GPA: 1.2/1, excellent with distinction
2009–2014 *Tongji Universtiy*, B.E. Civil Engineering, GPA: 4.38/5
2011–2012 *Hong Kong Polytechnic University*, Exchange Program

Skills

Programming Python, Fortran, C/C++, Matlab/Simulink, CUDA
Package PETSc, PyTorch, Numpy, Pandas, Scipy, Matplotlib, SQLite, AiiDA
FEM software Abaqus, MSC Marc, Ansys
Open source LAMMPS, ParaDiS, FEniCS, DAMASK, deal.II
Graphic modeling AutoCAD, ParaView, Gmsh, OVITO
Office MS Office, LaTeX, Inkscape
Other Linux, SLURM, High Performance Computing (USI-CSCS certificate)
Language Chinese (mother tongue) English (working proficiency)
German (TestDaF 19/20) French B1
Expertise Mechanics, Materials, Machine Learning, Optimization, Numerical Methods

Additional Coding Competence

- create DAMASK GPT for users to learn and use DAMASK (openai platform)
- use ollama and open-webui (docker) to deploy local LLM for internal users
- small tool for simulation database: https://github.com/hyharry/mini_sim_db
- crystal plasticity workflow: https://github.com/hyharry/cp_icme_workflow
- customized tool for simulation submission: https://github.com/hyharry/damask_submit_tool
- AI Agent skills for OpenClaw: simple-code, proactive-do, create-plugin, easy-ci-cd

Journal Publication

- **Yi Hu**, V. Shah, F. Roters and G. Falkinger. "Mechanistic-informed ductile phase-field damage model for microstructure failure under different loading states" *in preparation*.
- X. Chen, W. Gonçalves, **Yi Hu**, et al. "Secondary grain boundary dislocations alter segregation energy spectra." *Nature Communications* 16 (2025): 8422. doi:10.1038/s41467-025-64265-6.
- X. Liu et al., **Yi Hu**. "Discrete dislocation dynamics simulation of inclusion-induced loop and helical dislocation formation." *International Journal of Plasticity* (2025) 104459. doi:10.1016/j.ijplas.2025.104459.
- **Yi Hu**, and W.A. Curtin. "Modeling of precipitate strengthening with near-chemical accuracy: case study of Al-6xxx alloys." *Acta Materialia* 237 (2022): 118144. doi:10.1016/j.actamat.2022.118144.
- **Yi Hu**, and W.A. Curtin. "Modeling peak-aged precipitate strengthening in Al–Mg–Si alloys." *Journal of the Mechanics and Physics of Solids* 151 (2021): 104378. doi: 10.1016/j.jmps.2021.104378.
- **Yi Hu**, B.A. Szajewski, D. Rodney, and W.A. Curtin. "Atomistic dislocation core energies and calibration of non-singular discrete dislocation dynamics." *Modelling and Simulation in Materials Science and Engineering* 28 (2020): 015005. doi: 10.1088/1361-651X/ab5489.

Conference Presentation

- **Yi Hu**. "A unified damage formulation capturing the brittle-to-ductile transition with physical interpretation", 5th International Conference on Light Materials - Science and Technology, Trondheim (Norway) , 2023
- **Yi Hu**. "Modeling Orowan strengthening in Al–Mg–Si alloys", Material Science and Engineering Congress, Darmstadt (Germany) , 2020
- **Yi Hu**. "Atomistic dislocation core energies and the calibration to Discrete Dislocation Dynamics", 13th World Congress on Computational Mechanics, New York City, 2018
- **Yi Hu** and X. Ren. "XFEM Based Discontinuity Simulation for Saturated Soil", 6th International Conference on Nonlinear Mechanics, Shanghai, 2013

Other Activities

- *Master Thesis Supervision*: Hanyu Xu, RWTH Aachen, Influence of Textures and Intermetallic Particles on Damage Formation in Aluminum Alloys