

Rasool Ahmad

CONTACT INFORMATION	Postdoctoral Fellow (SNSF Early Postdoc Mobility Fellow) Micro and Nano Mechanics Group Department of Mechanical Engineering Stanford University CA 94305, USA	e-mail: rasool@stanford.edu e-mail: rasoolahmad.a@gmail.com Mobile: +1 408 384 2528 OrcID: 0000-0002-4154-6902 Google Scholar: ujjgd08AAAAJ
RESEARCH INTERESTS	Computational materials science, dislocation mechanics, atomistic simulation, plasticity, machine learning for science	
EDUCATION	École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland Ph.D. in Mechanics Advisor: Dr. William Curtin	Aug 1, 2016 - Oct 30, 2020
	Indian Institute of Technology, Kanpur, India B.Tech.-M.Tech. Dual Degree in Mechanical Engineering - Cumulative Performance Index (M.Tech.) - 10 (on a scale of 10) - Cumulative Performance Index (B.Tech.) - 8.2 (on a scale of 10)	Jul 15, 2011 - Jul 15, 2016
SELECT AWARDS AND HONORS	Recipient of the Early Postdoctoral Mobility Fellowship (2021-2022) awarded by the Swiss National Science Foundation. Selected for the Humboldt Postdoctoral Research Fellowship (2021). Received the Best Ph.D. Thesis Award by EDME (Mechanics) doctoral program, EPFL (2021). Nominated for the MSMSE Emerging Leader 2023 by the <i>Modelling and Simulation in Materials Science and Engineering</i> journal.	
PUBLICATIONS	<i>Total citations: 643</i> (Google Scholar, Jul 2023) R. Ahmad , M. Liu, M. Ortiz, T. Mukerji, and W. Cai, “Computation of effective elastic moduli of rocks using hierarchical homogenization”, <i>J. Mech. Phys. Solids</i> 174 (2023) 105268. M. Liu, R. Ahmad , W. Cai, and T. Mukerji, “Hierarchical homogenization with deep-learning-based surrogate model for rapid estimation of effective permeability from digital rocks”, <i>J. Geophys. Research: Solid Earth</i> (2022) e2022JB025378 R. Ahmad , and W. Cai, “Free energy calculation of crystalline solids using normalizing flows”, <i>Model. Simul. Mater. Sci. Eng.</i> 30 (2022) 065007 R. Ahmad , S. Paul and S. Basu, “Characterization of entanglements in glassy polymeric ensembles using the Gaussian linking number”, <i>Phys. Rev. E</i> 101 (2020) 022503. R. Ahmad , Z. Wu and W. A. Curtin, “Analysis of double cross-slip of pyramidal I $\langle c + a \rangle$ screw dislocations and implications for ductility in Mg alloys”, <i>Acta Mater.</i> 183 (2020) 228-241. R. Ahmad , B. Yin, Z. Wu and W. A. Curtin, “Designing high ductility in magnesium alloys”, <i>Acta Mater.</i> 172 (2019) 161-184. R. Ahmad , Z. Wu, S. Groh and W. A. Curtin, “Pyramidal II to basal transformation of $\langle c + a \rangle$ edge dislocations in Mg-Y alloys”, <i>Scr. Mater.</i> 155 (2018) 114-118. R. Ahmad , S. Groh, M. Ghazisaeidi and W. A. Curtin, “Modified embedded-atom method interatomic potential for Mg-Y alloys”, <i>Model. Simul. Mater. Sci. Eng.</i> 26 (2018) 065010. Z. Wu, R. Ahmad , B. Yin, S. Sandlöbes and W. A. Curtin, “Mechanistic origin and prediction of enhanced ductility in magnesium alloys”, <i>Science</i> 359 (2018) 447-452.	

MANUSCRIPTS SUBMITTED	R. Ahmad , M. Liu, M. Ortiz, T. Mukerji, and W. Cai, "Homogenizing elastic properties of large digital rock images by combining CNN with hierarchical homogenization method", submitted to <i>Computer Methods in Applied Mechanics and Engineering</i> , arxiv preprint: arXiv:2305.06519,
CONFERENCE/ INVITED TALKS	<p>R. Ahmad, "From atoms to rocks: multiscale modeling of materials", <i>NASA-AMES</i>, (2023), Mountain View, CA, USA.</p> <p>R. Ahmad, "Microstructure and macroscopic properties of materials: Mg alloy, Si, and rocks", <i>Quantum Simulation Group, LLNL</i>, (2023), Livermore, CA, USA.</p> <p>R. Ahmad, and W. Cai, "Hierarchical homogenization method to find elastic properties of digital rocks", <i>GeoDict User Meeting</i>, (2023).</p> <p>R. Ahmad, and W. Cai, "Free energy calculation of crystalline defects using normalizing flows", <i>Multiscale Materials Modeling (MMM)</i> (2022) Baltimore, MD, USA</p> <p>R. Ahmad, and W. Cai, "Free energy calculation of crystalline solids using normalizing flows", <i>Materials Research Society (MRS) Spring Meeting</i> (2022) Honolulu, USA</p> <p>R. Ahmad, Z. Wu, and W. A. Curtin, "Pyramidal $\langle c+a \rangle$ cross-slip mediated ductility in Mg alloys ductility", <i>Mechanics and Computation Seminar, Stanford University</i> (2020), USA.</p> <p>R. Ahmad, Z. Wu, and W. A. Curtin, "Pyramidal $\langle c+a \rangle$ cross-slip mediated ductility in Mg alloys ductility", <i>Max Planck Institute for Iron Research</i> (2020) Düsseldorf, Germany.</p> <p>R. Ahmad, Z. Wu, and W. A. Curtin, "Pyramidal $\langle c+a \rangle$ cross-slip mediated ductility in Mg alloys ductility", <i>The Minerals, Metals & Materials Society (TMS)</i> (2020) San Diego, USA.</p> <p>W. A. Curtin, R. Ahmad, B. Yin and Z. Wu, "Design of Ductile Rare-Earth-Free Magnesium Alloys", <i>Magnesium Technology 2020</i>, 19-24</p> <p>R. Ahmad, Z. Wu, S. Groh and W. A. Curtin, "Pyramidal II to basal transformation of $\langle c + a \rangle$ edge dislocations in Mg-Y alloys and its implication for ductility", <i>Euromat</i> (2019) Stockholm, Sweden.</p>
RESEARCH EXPERIENCES	<p>Postdoctoral Fellow May 1, 2021 - current Swiss National Science Foundation (SNSF) Early Postdoc Mobility Fellow for the project titled <i>Investigation into finite temperature atomic-scale crystal plasticity through generative deep learning</i>. Micro and Nano Mechanics Group, Stanford University, California, USA Advisor: Dr. Wei Cai</p> <p>Graduate Student Researcher (Ph.D.) Aug 1, 2016 - Oct 30, 2020 <i>Atomic Scale Investigations into the Origins of Ductility in Mg Alloys</i> École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland Advisor: Dr. William Curtin</p> <p>Graduate Student Researcher (M.Tech.) Jul 15, 2015 - Jul 15, 2016 <i>Investigation into disentanglement of polymer chains in a glassy amorphous polymer through molecular dynamics simulations</i> Indian Institute of Technology, Kanpur, India Advisor: Dr. Sumit Basu</p>
SERVICES	<p>- Referee services for journals Acta Materialia, and CALPHAD: Computer Coupling of Phase Diagrams and Thermochemistry</p> <p>- Session-chair in conferences Multiscale Materials Modeling, 2022, Baltimore, MD, USA</p>

ACADEMIC PROJECTS	Kinetic Monte Carlo simulation of screw dislocation mobility in BCC metals		Feb - Jun 2019
	Updated Lagrangian Finite Element Formulation		Aug - Nov 2014
	Static Equilibrium of a Red Blood Cell		Aug - Nov 2014
	Minimum Energy Path of a Reaction Using Nudge Elastic Band Method		Jan - Apr 2014
SELECT COURSES	<ul style="list-style-type: none"> - Computational Multiscale Modeling of Solid - Nature and Properties of Materials - Fracture mechanics - Theory of Elasticity - Mechanics of Biological Membrane - Non-Linear Vibration - Topics in Topology - Linear Algebra and Ordinary Diff Eqns - Real Analysis and Calculus 		
	<ul style="list-style-type: none"> - Molecular Modeling in Chemistry - Non-Linear Finite Element Method - Finite Element Method - Advanced Mechanics of Solid - Wave Propagation in Elastic Solid - Rheology and Structure of Complex Fluids - Vibration and Control - Complex Analysis and Partial Diff Eqns - Fourier Analysis and Boundary Value Problems 		
TECHNICAL SKILLS	Programming Languages - Python, C, C++, FORTRAN, Matlab, PyTorch, JAX, DGL		
	Software - LAMMPS, ParaDis, Ovito, Abaqus, VASP		
TEACHING EXPERIENCES	Teaching Assistant, EPFL (Four semesters)		
	<ul style="list-style-type: none"> - Solid Mechanics - Introduction to Structural Mechanics 		Spring Semesters 2018, 2019, 2020 Spring Semester 2017
	Teaching Assistant, IIT Kanpur (Two semesters)		
	<ul style="list-style-type: none"> - Basic Electrical Engineering - Engineering Graphics and Design 		Fall Semesters 2016 Spring Semester 2015
REFERENCES	Wei Cai Professor Department of Mechanical Engineering Stanford University, USA caiwei@stanford.edu		
	William Curtin Professor Institute of Mechanical Engineering EPFL, Switzerland william.curtin@epfl.ch		
	Zhaoxuan Wu Assistance Professor Department of Materials Science and Engineering City University of Hong Kong, China zhaoxuwu@cityu.edu.hk		
	Sumit Basu Professor Department of Mechanical Engineering Indian Institute of Technology (IIT) Kanpur, India sbasu@iitk.ac.in		