

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).	
PUBLICATIONS	<i>Total citations: 535</i> (Google Scholar, Nov 2022) 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, “Computation of effective elastic moduli of rocks using hierarchical homogenization”, submitted to <i>J. Mech. Phys. Solids</i> , arXiv preprint arXiv:2208.02320 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”, submitted to <i>J. Geophys. Research - Solid Earth</i> , eprint essoar.10512161.1	

CONFERENCE/ INVITED TALKS	R. Ahmad , and W. Cai, “Free energy calculation of crystalline defects using normalizing flows”, <i>Multiscale Materials Modeling (MMM)</i> (2022) Baltimore, MD, USA	
	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	
	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.	
	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.	
	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.	
	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	
	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.	
RESEARCH EXPERIENCES	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	
	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	
	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	
SERVICES	- Referee services for journals Acta Materialia, and CALPHAD: Computer Coupling of Phase Diagrams and Thermochemistry	
	- Session-chair in conferences Multiscale Materials Modeling, 2022, Baltimore, MD, USA	
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	- Computational Multiscale Modeling of Solid	- Molecular Modeling in Chemistry
	- Nature and Properties of Materials	- Non-Linear Finite Element Method
	- Fracture mechanics	- Finite Element Method
	- Theory of Elasticity	- Advanced Mechanics of Solid
	- Mechanics of Biological Membrane	- Wave Propagation in Elastic Solid
	- Non-Linear Vibration	- Rheology and Structure of Complex Fluids
	- Topics in Topology	- Vibration and Control
	- Linear Algebra and Ordinary Diff Eqns	- Complex Analysis and Partial Diff Eqns
	- Real Analysis and Calculus	- Fourier Analysis and Boundary Value Problems

TECHNICAL
SKILLS

Programming Languages - Python, C, C++, FORTRAN, Matlab, PyTorch, DGL

Software - LAMMPS, ParaDis, Ovito, Abaqus, Gaussian

TEACHING
EXPERIENCES

Teaching Assistant, EPFL (Four semesters)

- Solid Mechanics
- Introduction to Structural Mechanics

Spring Semesters 2018, 2019, 2020
Spring Semester 2017

Teaching Assistant, IIT Kanpur (Two semesters)

- Basic Electrical Engineering
- Engineering Graphics and Design

Fall Semesters 2016
Spring Semester 2015

REFERENCES

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