

Alireza Ghafarollahi

POST-DOCTORAL RESEARCHER
COMPUTATIONAL MATERIALS DESIGN DEPARTMENT
MAX-PLANK-INSTITUTE FOR IRON RESEARCH
DUSSELDORF, 40237, GERMANY

a.ghafarollahi@mpie.de | alireza.ghafarollahi@gmail.com
Webpage : alirezaghafarollahi.github.io
(+49)15225975949

RESEARCH INTERESTS

solid mechanics, multi-scale materials design, computational materials science, atomistic simulation, machine learning for science

EDUCATION

Max-Plank-Institute for Iron Research, Dusseldorf, Germany

Post-doctoral researcher in Mechanical Engineering

Nov. 2023-present

Advisor: Prof. Erik Bitzek

Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland

Ph.D. in Mechanical Engineering

Feb. 2018-Mar. 2022

Advisor: Prof. William Curtin

Sharif University of Technology, Tehran, Iran

M.S. in Civil Engineering,

Oct. 2012-Sept. 2014

Advisor: Prof. Hossein Mohammadi Shodja

Amirkabir University of Technology, Tehran, Iran

B.S. in Civil Engineering

2008-2012

AWARDS AND SCHOLARSHIPS

Swiss National Science Foundation PostDoc Mobility Fellowship, 2022

PUBLICATIONS

A. Ghafarollahi “CNN-based prediction of solute/screw interaction energies in BCC random alloys”, under preparation.

A. Ghafarollahi and W. A. Curtin, “The strength plateau at intermediate temperatures in BCC High-Entropy Alloys: a Dynamic Strain Aging mechanism”, under review in *Modelling Simul. Mater. Sci. Eng.*

A. Ghafarollahi and W. A. Curtin, “Screw-controlled strength of BCC non-dilute and High-Entropy alloys”, *Acta Mater.* 117617 (2022)

R. Kubilay, **A. Ghafarollahi**, F. Maresca and W. A. Curtin, “High Energy Barriers for Edge Dislocation Motion in BCC High Entropy Alloys”, *Npj Comput. Mater.* 7, 112 (2021)

A. Ghafarollahi and W. A. Curtin, “Theory of kink migration in dilute BCC alloys”, *Acta Mater.* 117078 (2021)

A. Ghafarollahi and W. A. Curtin, “Theory of double-kink nucleation in dilute BCC alloys”, *Acta Mater.* 196 (2020) 635-650.

A. Ghafarollahi, F. Maresca and W. A. Curtin, “Solute/screw dislocation interaction energy parameter for strengthening in bcc dilute to high entropy alloys”, *Modelling Simul. Mater. Sci. Eng.* 27 (2019) 085011

A. Ghafarollahi and H.M. Shodja, “Scattering of transverse surface waves by a piezoelectric fiber in a piezoelectric half-space with exponentially varying electromechanical properties”, *ZAMP.* 70 (2019) 1-19.

A. Ghafarollahi and H.M. Shodja, "Scattering of SH-waves by an elliptic cavity/crack beneath the interface between functionally graded and homogeneous half-spaces via multipole expansion method", J Sound Vib. 435 (2018) 372-389.

A. Ghafarollahi and H.M. Shodja, "Scattering of SH-waves by a nano-fiber beneath the interface of two bonded half-spaces within surface/interface elasticity via multipole expansion", Int J Solids Struct. 130 (2018) 258-279.

H.M. Shodja and **A. Ghafarollahi**, "An embedded couple stress micro-/nano-obstacle with micro-inertia incident upon by SH-waves", Acta Mech. 229 (2018) 3333-3354.

H.M. Shodja, **A. Ghafarollahi** and C. Enzevae, "Surface/interface effect on the scattering of love waves by a nano-size surface-breaking crack within an ultra-thin layer bonded to an elastic half-space", Int J Solids Struct. 108 (2017) 63-73.

RESEARCH
EXPERIENCES

Postdoctoral Fellow

Nov. 2022-current

Atomistic simulations of Fracture in Laves phases
Max-plank-institute for iron research, Dusseldorf, Germany
Advisor: Dr. Erik Bitzek

Graduate Student Researcher (Ph.D.)

Feb. 2018-Mar. 2022

Strengthening mechanisms in dilute and high-entropy BCC alloys
Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland
Advisor: Dr. William Curtin

Graduate Student Researcher (M.Sc.)

Oct. 2013- Sept. 2014

Surface/Interface effect on the scattering of Love waves by a surface-breaking crack
Sharif University of Technology, Tehran, Iran
Advisor: Dr. Hossein Mohammadi Shodja

SELECTED
COURSES

- Computational Multiscale Modeling of Solid
- Theory of Elasticity
- Mechanics of dislocations
- Fracture Mechanics
- Micromechanics of Defects in Solids
- Advanced Engineering Mathematics
- Finite Elements Method
- Dynamics of Structure
- Statistical Mechanics

TECHNICAL
SKILLS

Programming Languages - Python, C++, PyTorch, Tensorflow
Software - LAMMPS, Ovito, Abaqus, Mathematica, Matlab

TEACHING
EXPERIENCES

Teaching Assistant, EPFL

- Advanced solid mechanics Fall Semesters 2018,2019,2020
- Introduction to Structural Mechanics Spring Semesters 2019,2020,2021

Teaching Assistant, SUT Tehran

- Advanced Engineering Mathematics Fall 2014

REFERENCES

William Curtin

Professor
Mechanical Engineering
École Polytechnique Fédérale de Lausanne
william.curtin@epfl.ch

Erik Bitzek

Professor
Department of computational Materials Design
Max-Plank-Institute for Iron Research, Dusseldorf, Germany
e.bitzek@mpie.de

Hossein Mohammadi Shodja

Professor
Civil Engineering
Sharif University of Technology
shodja@sharif.edu , shodja.hossein@gmail.com

Francesco Maresca

Assistant Professor
Faculty of Science and Engineering
University of Groningen
f.maresca@rug.nl