

# Mohammadreza Khoshbin

## Curriculum Vitae

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### CONTACT INFORMATION

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Website: www.mkhoshbin.com      GitHub: mkhoshbin1

### RESEARCH INTERESTS

I am interested in expanding the depth and breadth of my knowledge and experience in the field of micromechanics of materials. I am particularly interested in the following subjects:

- Damage initiation and growth
- Dual- and multi-phase steels
- Voxel-Based modeling of microstructures

### EDUCATION

**PhD Candidate of Mechanical Engineering, Design of Solids** 2019 – present  
*Shahid Rajaei Teacher Training University, Tehran, Iran*

**M.Sc. in Mechanical Engineering, Applied Design** 2017 – 2019  
*Shahid Rajaei Teacher Training University, Tehran, Iran*

Supervisors: Professors Ali Pourkamali Anaraki and Javad Kadkhodapour  
Thesis title: Micromechanical Investigation of Damage and Low Cycle Fatigue Properties in Dual-Phase Steel

Research Highlights:

- Designed and performed experimental interrupted fatigue tests coupled with scanning electron microscopy on commercial DP600 steel to observe failure mechanisms during fatigue loading.
- Proposed a model for initiation, propagation, and coalescence of damage in fatigue loading of dual-phase steels.
- Extended my framework for approximating material behavior in the dislocation-rich interface between the ferrite and martensite phase of dual-phase steels.
- Applied the said model for micromechanical finite element simulation of tensile and fatigue loading of DP600 commercial steel.

**B.Sc. in Mechanical Engineering, Design of Solids** 2013 – 2017  
*Shahid Rajaei Teacher Training University, Tehran, Iran*

Project Title: Investigation of the Effect of Damage in the Interphase of the DP980 Steel

Main achievements:

- Was selected for a national scholarship combining a B.Sc. in mechanical engineering and a teacher-training program.
- Earned qualifications required to be awarded tenure as a technical teacher based on understanding of educational techniques and relevant subject matter.
- Volunteered as a laboratory technician and undergraduate researcher in the *Laboratory for Micromechanics and Biomechanics* for 6 semesters.
- Introduced a framework for approximating material behavior in the dislocation-rich interface between the ferrite and martensite phases of dual-phase steels and presented the results at the *25th Annual Conference on Mechanical Engineering*, Tehran, Iran.
- As the director of the Student Scientific Society of Nanotechnology, lead a team of 5 students to host a low-budget, volunteer-based seminar in the university as part of *Iran Nanotechnology Initiative Council's* efforts to promote nanotechnology at the university level.

### PROFESSIONAL EXPERIENCE

**Shahid Rajaei Teacher Training University, Tehran, Iran**

**Researcher**

Dec 2013 – present

*Laboratory for Micromechanics and Biomechanics*

I currently conduct research under supervision of professors Ali Pourkamali Anaraki and Javad Kadkhodapour. My main research activities are:

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- Investigated fatigue life of notched dual-phase steel specimens using interrupted in-situ testing.
- Investigated the effect of modeling gradient ferrite-martensite interphase on accuracy of FEA in the RVE framework.
- Developed and maintained the *PyAuxetic* Abaqus plugin for automatic modeling, analysis, and post-processing of auxetic metamaterials.
- Developed and maintained the free and open source VCAMS software for voxel-based modeling of complex structures. Refer to the Open Source Contributions section for more details.

### Laboratory Technician

Jan 2015 – Jan 2017

### Intern

Summer 2015

*Laboratory for Micromechanics and Biomechanics*

Provided the following services on a volunteer basis:

- Maintained and managed the laboratory's computational resources.
- Provided intensive training and troubleshooting for Abaqus, Matlab, EndNote, and Mendeley software packages.
- Trained members in use of FDM 3D printers and related design and software skills.

### Ministry of Education, Iran

#### Head of the Educational Department of Auto Mechanics

Sep 2021 – present

*District Educational Office 2 of Rasht, Guilan*

I am appointed to this leadership position which adds the following to my regular teaching responsibilities:

- Supervision and evaluation of the education provided to around 800 students across three schools and 12 workshops.
- Evaluation of the in-person and online teaching activities of the department's 20 teachers and technicians.
- Providing professional development courses offered to the department members.
- Mentoring and knowledge transfer to early-career teachers joining any of the educational departments of auto mechanics in the province of Guilan, Iran.
- Various tasks that ensure smooth operation of the department. These include ombudsmanship, organizational diplomacy, and providing consultations to various officials in any level of the Ministry of Education's management hierarchy.

#### Technical Teacher of Auto Mechanics

*Alaghemandan Vocational High School, Rasht, Iran*

Sep 2021 – present

*Shahid Khodadadi Technical High School, Bandar-e Anzali, Iran*

Feb 2017 – Sep 2021

My main responsibilities include:

- Promoting a fun, relaxed, and supportive learning environment for imparting theoretical and practical knowledge to my students so they can start their careers in various industries, particularly the automotive repair and maintenance industry.
- Adapting and implementing curricula within the scope of national and local protocols to meet the needs of each individual classroom.
- Providing counseling to students based on their individual needs or, if appropriate, referring them to professional counselors.
- Managing student behavior and resolving possible conflicts.
- Developing and administering specific assignments and assessments to judge students' competency levels and providing appropriate feedback.

#### Teacher in Training

Jan 2013 – Jan 2017

#### Student Teacher

Oct 2016 – Dec 2016

*Shahid Rajaee Teacher Training University, Tehran, Iran*

As part of a national scholarship:

- Completed a teacher training course parallel to a B.Sc. in mechanical engineering and became qualified as a technical teacher.
- Completed two semester-long teaching internships.
- Was awarded tenure at the end of studies.

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**OPEN SOURCE CONTRIBUTIONS** I actively try to make my research code available as open-source software. because it greatly increases the quality of the research and makes it more reproducible. I also try to help out with bug fixes and documentation in the projects and libraries that I frequently use.

My repositories can be found on GitHub under the username mkhoshbin1.  
Some of the projects that I have contributed to are listed below:

- **VCAMS: A Program and Python Library for Voxel-Based Computer-Aided Modeling of Complex Structures**

*Role: Author, Maintainer*

A library with a GUI for rapid creation of large and complex finite element models. Uses NumPy, scikit-image, Matplotlib, PyQt5, and Sphinx.

Published under AGPLv3 on GitHub and available on PyPI.

- **pyAuxetic**

*Role: Author, Maintainer*

An Abaqus™ plugin and Python library for automatic modeling, analysis, and post-processing of auxetic materials. It was written using Abaqus' Python Scripting Interface and the GUI was created using the FOX GUI Toolkit. It also takes full advantage of the said API's parametric modeling capabilities to create the structures.

Published under AGPLv3 on GitHub.

- **pyinstaller-versionfile**

*Role: Contributor*

A Python module that helps with creating version-info files for PyInstaller. I helped with improving the documentation.

### TEACHING

#### Workshops

- *How Can We Introduce Our School Using a Short Animation?*, Educational Department of Auto Mechanics, District Educational Office 2 of Rasht, Guilan, Iran, March 2022.
- *Classroom Management, Student Interaction, and Teaching in Auto Mechanics School Workshops*, Taught to early-career teachers, Provincial Educational Department of Auto Mechanics, Provincial Educational Office 2 of Guilan, Iran, February 2022.
- *Investigation of the Prevalent Problems in Auto Mechanics School Workshops*, Educational Department of Auto Mechanics, District Educational Office 2 of Rasht, Guilan, Iran, December 2021.

### JOURNAL PUBLICATIONS

- [1] A. Cheloe Darabi, J. Kadkhodapour, A. Pourkamali Anaraki, M. Khoshbin, A. Alaie, and S. Schmauder, "Micromechanical modeling of damage mechanisms in dual-phase steel under different stress states," *Engineering Fracture Mechanics*, vol. 243, 107520, Feb. 2021, ISSN: 0013-7944. DOI: 10.1016/j.engfracmech.2020.107520. [Online]. Available: <http://www.sciencedirect.com/science/article/pii/S0013794420310754>.
- [2] S. Rastgordani, A. Ch Darabi, J. Kadkhodapour, S. Hamzeloo, M. Khoshbin, S. Schmauder, and J. Mola, "Damage characterization of heat-treated titanium bio-alloy (ti-6al-4v) based on micromechanical modeling," *Surface Topography: Metrology and Properties*, vol. 8, no. 4, 045016, Oct. 2020, ISSN: 2051-672X. DOI: 10.1088/2051-672x/abc0f8. [Online]. Available: <https://doi.org/10.1088/2051-672x/abc0f8>.

### CONFERENCE PUBLICATIONS

- [3] M. Khoshbin, A. Cheloe Darabi, J. Kadkhodapour, A. Pourkamali Anaraki, and S. Schmauder, "The effect of interpolation functions in numerical simulation of interphase in dual-phase steels," in *29th International Workshop on Computational Mechanics of Materials (IWCM29)*, (University of Zagreb, Dubrovnik, Croatia), Sep. 15–18, 2019.

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- [4] M. Khoshbin, A. Cheloe Darabi, J. Kadkhodapour, A. Pourkamali Anaraki, and S. Schmauder, "Numerical determination of optimal interphase thickness in dual-phase steels," in *The 27th Annual International Conference of Iranian Society of Mechanical Engineers*, (Tarbiat Modares University, Tehran, Iran), Apr. 30–May 2, 2019, p. 66.
- [5] M. Khoshbin, A. Cheloe Darabi, S. Rastgordani, J. Kadkhodapour, A. Pourkamali Anaraki, and S. Schmauder, "The effect of interphase in micromechanical modeling of dual-phase steel," in *25th Annual International Conference on Mechanical Engineering*, (Tarbiat Modares University, Tehran, Iran), May 2–4, 2017, pp. 121–122.

### PATENTS

- [6] M. Khoshbin, "Teaching aid for practical teaching of measurement using vernier caliper," IR Patent No. 98632, May 21, 2019.

### SKILLS

#### Language Skills

Farsi	Native
English	CEFR Level: C2 IELTS Score: 8.5

#### Technical Skills

##### CAD/CAE Software

Abaqus	(Advanced)
CATIA	(Beginner)
SolidWorks	(Beginner)

##### Programming/Scripting Languages

Python	(Advanced)
Abaqus' Python Scripting Interface	(Expert)
MATLAB	(Advanced)
Windows PowerShell/Batch	(Intermediate)
C/C++	(Beginner)

##### Other Programming Libraries/Tools

NumPy, PyQt5, Matplotlib, Sphinx, MATLAB Image Processing Toolbox, MATLAB GUI Development, Git, SVN.

##### Other Technical Skills

Adobe Photoshop, Camtasia, Hugo, Latex, Mendeley, Office Software, WordPress.