

Maryam Hakimzadeh

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SUMMARY

I am a senior **PhD candidate** at **Carnegie Mellon University (CMU)**, and a graduate research assistant in **Computational Mechanics**. My research primarily focuses on developing **mathematical models** and using **finite element analysis (FEA)** and **numerical methods** to solve **mechanical** and **material problems**. Most of my works fall into **FEA Modeling**, **Mechanics of Material**, and **Machine Learning for FEA**.

EDUCATION

Carnegie Mellon University Pittsburgh, PA
Ph.D. in Computational Mechanics, GPA: 4.0/4.0 2020 - Jun 2024 (Expected)
· Thesis Title (tentative): Improving Phase-Field Modeling of Fracture Mechanics using Finite Element Analysis

Sharif University of Technology Tehran, Iran
M.Sc. in Civil and Environmental Engineering , GPA: 4.0/4.0 2016 - 2019
B.Sc. in Civil and Environmental Engineering , GPA: 3.81/4.0 2012 - 2016

EXPERIENCE

Carnegie Mellon University , Graduate Research Assistant Aug 2020 - Present, Pittsburgh, PA

Ph.D. Projects:

- **Fracture Mechanics** with an Effective Energy using **Phase-Field Modeling** (Nonlinear FEA, Hyperelastic **Nonlinear Material**, Fracture in **Brittle** and **Soft Material**, **Crack Contact**, **FEniCS** simulations) 🌐
- **Anisotropic Fracture** Model under Compression and Confinement (Fracture Propagation in Anisotropic Material, High Performance Computing (**HPC**)) 🌐
- **Crack Nucleation** and Propagation Using a Modified Fracture Mechanics Model (**Dynamic FEA**, **Explicit and Implicit FEA**, Numerical Methods)

Course Projects:

- FEA Analysis for **Elasto-Plastic** Material under **Contact** using Ansys 🌐
- **Fatigue and Failure** Assessment and Optimization under Diverse Loading Conditions 🌐
- **Structural Design** and **Optimization** of a Beam-Based Tower for Optimal Load Distribution and Safety 🌐
- **Thermal Optimization** of CPU Performance: A Finite Element Analysis Study on Heat Sink Design Efficacy (Steady and **Transient** Thermal Analysis, **Fluid Flow** Simulation, FEA with Ansys Fluent) 🌐
- Structural **Dynamics** Analysis Subject to Pressure Wave Impacts: **Vibration**, **Modal**, and Harmonic **Assessments** 🌐
- Employing **Deep Learning (Transformers)** for Predicting the Dynamics of the **Burgers' Equation** 🌐

University of Southern California, Graduate Research Assistant Aug 2019 - Aug 2020, Los Angeles, CA

Selected Project:

- Data-Driven Analysis of Biomass Burning Impact on Public Health in Metropolitan Area of Milan (**Statistical Data Analysis** and Data **Visualization**, Machine Learning)

TECHNICAL SKILLS

FEA Simulation and Design	FEniCS, Ansys (Mechanical, Fluent), Abaqus, COMSOL MultiPhysics
Design and Processing Softwares	CIVIL 3D, SolidWorks, Ansys Discovery, CAD, Gmsh, ParaView
Programming	Python, C/C++, MATLAB, Wolfram Mathematica , MPI
Data Analysis, ML & Deep Learning	PyTorch, scikit-learn, R, SPSS

PUBLICATIONS

Phase-field finite deformation fracture with an effective energy for regularized crack face contact

M. Hakimzadeh, V. Agrawal, K. Dayal, C. Mora-Corral **Journal of the Mechanics and Physics of Solids (JMPS)**

A Phase-Field Analysis of Mixed-Mode Fracture under Compression in Strongly Anisotropic Geomaterials

M. Hakimzadeh, C. Mora-Corral, N. Walkington, G. Buscarnera, and K. Dayal Under Submission

The impact of biomass burning on the oxidative potential of PM_{2.5} in the metropolitan area of Milan

M. Hakimzadeh, E. Soleimanian, A. Mousavi, et al. **Atmospheric Environment**

RELATED GRADUATE COURSES

- Finite Element Methods
- Numerical Methods
- Math Techniques (Solving PDEs)
- Continuum Mechanics
- Elasticity
- Environmental Hydrodynamics
- Machine Learning
- Deep Learning
- Applied FEA

HONORS AND AWARDS

- Finalist for ASTM MR Mitchell Student Presentation Forum on Fatigue and Fracture Mechanics. 2023
- Awarded Fenves Travel Grants, CMU CEE Department. 2023
- Steinbrenner Institute Doctoral Fellowship for Environmental Education and Research. 2022
- CMU CEE Department Fellowship. 2020

SELECTED CONFERENCE PRESENTATIONS

A Phase-Field Fracture Model for Anisotropic Materials Under Compressive Loading

M. Hakimzadeh, K. Dayal, and C. Mora-Corral, SIAM MS24

Simulating Crevasse Nucleation and Propagation Using a Modified Fracture Mechanics Model

M. Hakimzadeh, D. Rounce, and K. Dayal, AGU23

A Phase-Field Fracture Model for Complex Loadings in Space

M. Hakimzadeh, V. Agrawal, C. Mora-Corral, G. Gazonas, N. Walkington and K. Dayal, STM 21st International Symposium on Fatigue and Fracture Mechanics