

Maryam Hakimzadeh

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Education

Carnegie Mellon University:

Ph.D. in Computational Mechanics (Anticipated Summer 2024), **GPA: 4.00/4.00**

Thesis: "Improving Phase-Field Modeling of Fracture Mechanics with Application in Geo-Environmental Problems" (tentative)

M.Sc. in Civil and Environmental Engineering (May 2022), **GPA: 4.00/4.00**

Thesis: "Phase-Field Finite Deformation Fracture with an Effective Energy for Regularized Cracks"

Sharif University of Technology:

M.Sc. in Environmental Engineering (May 2019), **GPA: 4.00/4.00**

Thesis: "Identifying Particulate Matter Sources Using Dispersion Modeling in Tehran"

B.Sc. in Civil Engineering (Sep 2016), **GPA: 3.81/4.00**

Thesis: "Evaluation of Different Waste Oils as Workability Promoter in Hot Mix Asphalts"

PhD Projects

Phase-Field Finite Deformation Fracture with an Effective Energy for Regularized Cracks (Aug 2020 - June 2022):

- Conceptualized a novel phase-field fracture mechanics model, inspired by contact mechanics.
- Modeled hyperelastic material (nonlinear material modeling for soft and brittle material).
- Validated model using energy minimizing & finite element methods for quasi-static loadings.
- Submitted the result of this project to [JMPS](#), and the code is available [here](#).

A Phase-Field Analysis of Fracture under Compression in Strongly Anisotropic Geomaterials (Jun 2022 - present):

- Extended our phase-field fracture model to incorporate the complexities of anisotropic materials.
- Incorporated anisotropy into the elasticity and fracture energy within our model.
- Employed finite element analysis to accurately evaluate the model's performance.

Simulating Crack Nucleation and Propagation Using a Modified Fracture Mechanics Model (Sep 2022-present):

- Formulated and developed a physical model that integrates crack nucleation dynamics with material's fracture strength.
- Conducted extensive simulations using finite element methods to validate the model's efficacy.

Programming and Software Skills

Programming Languages: Advanced: Python (e.g., scikit-learn, PyTorch); Intermediate: MATLAB, R; Basic: C++, Turbo Pascal

Softwares: Expert: FEniCS; Advanced: Ansys, SPSS, CAD, SpaceClaim, Gmsh, Wolfram Mathematica; Intermediate: Abaqus, CIVIL 3D, SolidWorks, MPI; Basic: COMSOL MultiPhysics,

Operating Systems: Windows, Linux, macOS


Publications

Hakimzadeh, Maryam, et al. "The impact of biomass burning on the oxidative potential of PM_{2.5} in the metropolitan area of Milan." *Atmospheric Environment* 224 (2020): 117328.

Hakimzadeh, Maryam, et al. "Phase-field finite deformation fracture with an effective energy for regularized crack face contact." *Journal of the Mechanics and Physics of Solids* 167 (2022): 104994.

Hakimzadeh, Maryam, et al. "A Phase-Field Analysis of Mixed-Mode Fracture under Compression in Strongly Anisotropic Geomaterials" (To be Submitted to *Journal of the Mechanics and Physics of Solids*)

Additional Short Projects (Related to Simulation and Data Analysis)

- Applied FEA (Static, Pseudo-static, Dynamic, Modal, Buckling, Contact, Heat Transfer, Thermal Stress and Thermal Shock Analysis with Ansys Software) (Spring 2024, CMU) 
- Integrated Thermo-Structural Dynamics of a Plate under Transient Loading (Coupled Physics analysis) (Fall 2023, CMU)
- Finite Element Analysis and Stress Evaluation in a Formula One Wheel Hub: Evaluating Press-Fit Interference and Torque-Induced Stresses Using Ansys Software (Fall 2021, CMU)
- Finite Element Analysis and Theoretical Correlation in Lug Joint Stress Concentration with a Focus on Displacement and Pressure Models (Fall 2021, CMU)
- Data-Driven Analysis of Biomass Burning Impact on PM2.5 Oxidative Potential in Metropolitan Area of Milan (Fall 2019-Spring 2020, USC)
- Air Pollution Modeling for a New York Factory Using AERMOD Software (Spring 2017, SUT)
- Study of Pollution Peak Attenuation in Flume Outlets and Tidal Dispersion in Estuary Models (Fall 2016-Spring 2017, SUT)

Awards and Honors

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| - Finalist for ASTM MR Mitchell Student Presentation Forum on Fatigue and Fracture Mechanics. | 2023 |
| - Awarded Fenves Travel Grants, CMU CEE Department. | 2023 |
| - Invited participant at CMU Rising Stars Workshop. | 2022 |
| - Steinbrenner Institute Doctoral Fellowship for Environmental Education and Research. | 2021 |
| - CMU CEE Department Fellowship. | 2020 |
| - Viterbi School of Engineering/Graduate School Fellowship for Incoming Students. | 2019 |
| - Credited by the Office of Exceptional Talents at Sharif University for entering Ph.D. program. | 2018 |
| - Credited by the Office of Exceptional Talents at Sharif University for entering M.Sc. program. | 2016 |

Conference Presentations

Hakimzadeh, Maryam, David Rounce, and Kaushik Dayal. "Simulating Crevasse Nucleation and Propagation Using a Modified Fracture Mechanics Model." AGU23.

Hakimzadeh, Maryam, Vaibhav Agrawal, Carlos Mora-Corral, George Gazonas, Noel Walkington and Kaushik Dayal, "A Phase-Field Fracture Model for Complex Loadings in Space", ASTM 21st International Symposium on Fatigue and Fracture Mechanics.

Hakimzadeh, Maryam, and Habib Hakimzadeh, "Numerical Simulation of the Tidal Dispersion of Contamination in a Model of Estuary", 12th International Conference on Coasts, Ports and Marine Structures.

Hakimzadeh, Maryam, and Habib Hakimzadeh, "An Investigation into Peak Attenuation of the Inlet Pollution at the Outlet of a Flume", 10th National Congress on Civil Engineering.

Teaching Experience

Teaching Assistant, Carnegie Mellon University (2021 - present): Finite Element Methods, Geology

Teaching Assistant, Sharif University of Technology (2015 - 2018): Solid Mechanics Lab, Hydraulics, Environmental Eng, Fluid Mechanics, Processes in Environmental Eng.

Selected Graduate Courses

Finite Element Methods | Numerical Methods in Eng. | Math Techniques in Chemical Eng. (Heat Transfer Equations) | Intro to Continuum Mechanics | Elasticity | Continuum Mechanics & Multiscale Models | Environmental Hydrodynamics | Solid Mechanics | Machine Learning & Artificial Intelligence for Eng. | Deep Learning (Spring 2024) | Applied FEA (Spring 2024)