

FAN FEI

Postdoctoral Researcher

Atmospheric, Earth, and Energy Division

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EDUCATION

The University of Hong Kong, Hong Kong SAR

Ph.D. in Civil and Environmental Engineering

2018 - 2021

Dissertation: Phase-field approaches to discontinuities and fractures in geologic materials

Supervisor: Prof. Jinhyun Choo

The University of Hong Kong, Hong Kong SAR

Bachelor of Engineering, with first honor graduation

2014 - 2018

Minor in Finance

WORK EXPERIENCES

Atmospheric, Earth, and Energy Division, Lawrence Livermore National Laboratory, CA, USA

Postdoctoral researcher

2022 -

PUBLICATIONS

The most up-to-date publication list can be seen in [Google Scholar](#).

Preprints

- [1] **F. Fei**, M.S. Mia, A.E. Elbanna, and J. Choo. (2022) A phase-field model for quasi-dynamic nucleation, growth, and propagation of rate-and-state faults. Under review.
- [2] J. Choo, Y. Sun, and **F. Fei**. (2022) Size effects on the strength and cracking behavior of flawed rocks under uniaxial compression: From laboratory scale to field scale. Under review.
- [3] **F. Fei** and J. Choo. (2021) Extended Barton–Bandis model for rock joints under cyclic loading: Formulation and an implicit algorithm. Under review.

Journal Articles

- [1] **F. Fei**, J. Choo, C. Liu, and J.A. White. (2022) Phase-field modeling of rock fractures with roughness. *International Journal for Numerical and Analytical Methods in Geomechanics*, [doi:10.1002/nag.3317](https://doi.org/10.1002/nag.3317).
- [2] J. Choo, A. Sohail, **F. Fei**, and T.-f. Wong. (2021) Shear fracture energies of stiff clays and shales. *Acta Geotechnica*, [doi:10.1007/s11440-021-01145-5](https://doi.org/10.1007/s11440-021-01145-5).
- [3] **F. Fei** and J. Choo. (2021) Double-phase-field formulation for mixed-mode fracture in rocks. *Computer Methods in Applied Mechanics and Engineering*, 376, 113655. [doi:10.1016/j.cma.2020.113655](https://doi.org/10.1016/j.cma.2020.113655)

- [4] F. Fei and J. Choo. (2020) A phase-field model of frictional shear fracture in geologic materials. *Computer Methods in Applied Mechanics and Engineering*, 369, 113265. [doi:10.1016/j.cma.2020.113265](https://doi.org/10.1016/j.cma.2020.113265)
- [5] F. Fei and J. Choo. (2020) A phase-field method for modeling cracks with frictional contact. *International Journal for Numerical Methods in Engineering*, 121(4), 740–762. [doi:10.1002/nme.6242](https://doi.org/10.1002/nme.6242)

Conference Papers

- [1] F. Fei, Y. Sun, L.N.Y. Wong, and J. Choo. (2021) Phase-field modeling of mixed-mode cracking in rocks: From laboratory scale to field scale. In *Proceedings of the 55th US Rock Mechanics/Geomechanics Symposium*. Accepted.
- [2] J. Choo and F. Fei. (2020) Phase-field modeling of geologic fracture incorporating pressure-dependence and frictional contact. In *Proceedings of the 2nd International Conference on Energy Geotechnics*. [doi:10.1051/e3sconf/202020503004](https://doi.org/10.1051/e3sconf/202020503004)

Theses

- [1] F. Fei. (2021) Phase-field approaches to discontinuities and fractures in geologic materials.

RESEARCH PROJECTS

Coupled numerical investigation of the stress and seismic behavior in an enhanced geothermal system 2022 -
 The work aims at developing and applying a thermo-hydro-mechanical-chemical plus earthquake (THMC+E) modeling framework to explore how the variation of the fracture permeability influences the reservoir stresses and seismic slip behaviors in an enhanced geothermal system.

Phase-field modeling of near-wellbore hydraulic fracture nucleation and propagation in an enhanced geothermal system 2022 -
 The work aims at developing and applying the phase-field method in a massively parallel computing platform to model the near-wellbore hydraulic fracture propagation for an enhanced geothermal research project.

Computational modeling of fractures and discontinuities in geomaterials 2018 - 2021
 The work aims at developing physically reliable and computationally efficient methods for modeling geologic fractures and discontinuities in subsurface systems (e.g. joints, slip surfaces and faults).

TEACHING AND SUPERVISION EXPERIENCE

Teaching Assistant

CIVL2106: Soil Mechanics, HKU (Fall and Spring Semesters) 2018 - 2021
 CIVL8013: Computational Geomechanics, HKU (Spring Semesters) 2019 - 2021
 CIVL6078: Rock Mechanics and Rock Engineering, HKU (Spring Semesters) 2019 - 2020

Undergraduate Student Supervised and Co-supervised

Ka Chun Lai, HKU 2020 - 2021
Topic: Numerical investigation of the Brazilian test.

Ammar Sohail, HKU 2019 - 2020
Topic: Shear fracture properties of stiff clays and shales.

AWARDS & HONORS

Runner-Up for the Computational Mechanics Committee Student Paper Competition,
Engineering Mechanics Institute (EMI) Conference 2021 2021

Hong Kong PhD Fellowship 2018-2021

Gammon Construction Ltd. Prize in Civil Engineering 2017

Chow Che King Prize 2017

Leung Ting Kui Scholarship 2016

C.L. Tse Prize in Civil Engineering 2015

ACADEMIC ACTIVITIES

Oral Presentations

2019 *Asian Pacific Congress on Computational Mechanics*, Taipei, Taiwan 12/2019
Title: A phase-field method for modeling cracks with frictional contact.

2021 *Engineering Mechanics Institute Conference (virtual)*, New York, NY, USA 05/2021
Title: Phase-field modeling of shear fracture in geomaterials.

The 55th U.S. Rock Mechanics / Geomechanics Symposium (virtual), Houston, TX, USA 06/2021
Title: Phase-field modeling of mixed-mode fracture in rocks with discontinuities: from laboratory scale to field scale.

The 16th U.S. National Congress on Computational Mechanics (virtual) 07/2021
Title: Double-phase-field modeling of mixed-mode fracture in rocks.

Poster Presentations

2021 *Southern California Earthquake Center Annual Meeting (virtual)* 09/2021
Title: Phase-field modeling of rate- and state-dependent frictional faults.

Journals Reviewed

Computer Methods in Applied Mechanics and Engineering

ICE Geotechnical Research

KSCE Journal of Civil Engineering