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Engineering & Scientific Consulting

Mingjie Zhao, Ph.D.

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Professional Profile

Dr. Zhao received his Ph.D. from the Cornell Fracture Group with specializations in fracture mechanics, mechanics of materials, and computational modeling. He has an extensive background in multi-scale modeling of fatigue crack growth spanning the nano- to micro-scales using finite element analysis (FEA) and atomistic modeling. Dr. Zhao has expertise in structural analysis of fatigue and fracture behavior of materials and received advanced training in Unix-based cluster computing systems.

Dr. Zhao's doctoral research focused on studying the governing mechanisms of near-threshold fatigue crack growth in ductile and brittle materials under vacuum and ambient air conditions. He implemented a multi-scale computational model in Python and C++, which coupled a micro-scale continuum domain solved via FEA (FEniCS) with a nano-scale atomistic domain at the crack tip region solved via molecular statics (LAMMPS). His model helped improve the understanding of experimentally observed fatigue crack initiation by allowing direct observation of the material separation process at the crack tip plastic zone and provided insights on future fatigue-resistant material design.

While at Cornell University, Dr. Zhao served as a Teaching Assistant for solid mechanics, structural modeling and behavior, and geotechnical engineering classes. He won the annual John E. Perry Teaching Assistant Prize in the School of Civil and Environmental Engineering, which was awarded based on his concern and care for the students in his class and fulfillment of teaching functions both enthusiastically and skillfully.

Academic Credentials & Professional Honors

Ph.D., Civil and Environmental Engineering, Cornell University, 2022

B.S., Civil Engineering, University of California, Los Angeles (UCLA), 2016

Ross-Telelman Graduate Student Fellowship (2020-2022)

Chi Epsilon Honor Society (2015)

Academic Appointments

Graduate Teaching Assistant, School of Civil and Environmental Engineering, Cornell University, 2019-2022

Prior Experience

Graduate Research Assistant, Cornell University, 2017-2022

Professional Affiliations

American Society of Civil Engineers (member since 2014)

Languages

Mandarin Chinese

Publications

Zhao, M., Gu, W., & Warner, D. H. (2022). Atomic mechanism of near threshold fatigue crack growth in vacuum. Nature communications, 13(1), 1-10.

Falzone, G., Falla, G. P., Wei, Z., Zhao, M., Kumar, A., Bauchy, M., ... & Sant, G. (2016). The influences of soft and stiff inclusions on the mechanical properties of cementitious composites. Cement and Concrete Composites, 71, 153-165.

Presentations

Zhao, M. (2022, Feb. 27–Mar. 3). Atomic mechanism of near threshold fatigue crack growth in vacuum. The Minerals, Metals & Materials Society (TMS) 2022 Annual Meeting & Exhibition, Anaheim, California, USA