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Guangyang Hou, Ph.D.

Senior Engineer | Civil and Structural Engineering
Denver
+1-303-802-3389 | ghou@exponent.com

Professional Profile

Dr. Hou specializes in risk assessment of structures and resilience modeling of critical infrastructure systems such as power distribution and transportation systems, and particularly those subjected to natural forces such as ice storms, extreme winds, floodings, and earthquakes. He develops probabilistic simulation frameworks that support comprehensive disaster planning across mitigation, preparedness, response, and recovery phases. As a postdoctoral researcher at the University of Oklahoma, Dr. Hou focused on quantifying and enhancing the resilience of overhead power distribution systems. He developed frameworks for assessing system resilience under ice storms and extreme winds and evaluated the cost-effectiveness of various grid-hardening strategies. Specifically, he examined tree-induced risks to distribution systems by developing fragility models for tree-related component failures and empirical and analytical tree damage fragility functions. His expertise includes risk assessment, uncertainty quantification, structural analysis, finite element analysis, and network modeling.

Dr. Hou's doctoral research at Colorado State University primarily focused on assessing the performance of transportation systems subjected to multiple hazards. He investigated the seismic performance of curved and skewed simple-made-continuous bridges through comparative studies of bridges with varying bent connections and geometric configurations. He also developed an integrated model combining a vehicle crash model and a traffic flow simulation model to assess traffic safety performance under hazardous driving conditions. In another study, he developed windthrow fragility curves for three urban tree species and evaluated the probabilistic impacts of falling trees on transportation networks.

Dr. Hou also served as an instructor at the University of Oklahoma in 2022, where he taught a course for graduate students on infrastructure resilience. He also brings several years of industry design experience, including two years in bridge design and four years in storage tank design.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, Colorado State University, 2019

M.S., Bridge Engineering, Southwest Jiaotong University, 2011

Bachelors, Civil Engineering, Zhengzhou University, 2008

American Society of Civil Engineers: Colorado Section Younger Members Group Scholarship, 2018

Institute of Transportation Engineers: Colorado and Wyoming Section Graduate Level Scholarship, 2017

Colorado State University: Kenneth G. Medearis Scholarship, 2015

Licenses and Certifications

Professional Engineer, Colorado, #63832

Professional Engineer Civil, Oklahoma, #33505

Academic Appointments

Instructor, Infrastructure Resilience, University of Oklahoma, 2022

Prior Experience

Chief Structural Engineer, Roundtable Engineering Solutions, 2023-2025

Postdoctoral Research Associate, University of Oklahoma, 2021-2023

Design Engineer, Roundtable Engineering Solutions, 2020-2021

Research Assistant, Colorado State University, 2014-2019

Assistant Bridge Engineer, Zhejiang Provincial Institute of Communications Planning, Design and Research, 2011-2013

Publications

Campos R, Harvey PS, Hou G. Analytical fragility curves for trees subject to ice loading considering climate change. Sustainable and Resilient Infrastructure 2023; 1–17.

Hou G, Muraleetharan KK. Modeling the resilience of power distribution systems subjected to extreme winds considering tree failures: an integrated framework. International Journal of Disaster Risk Science 2023; 14(2):194–208.

Hou G. Evaluating efficiency and safety of mixed traffic with connected and autonomous vehicles in adverse weather. Sustainability 2023; 15(4):3138.

Hou G, Muraleetharan KK, Panchalogaranjan V, Moses P, Javid A, Al-Dakheeli H, Bulut R, Campos R, Harvey PS, Miller G, Boldes K, Narayanan M. Resilience assessment and enhancement evaluation of power distribution systems subjected to ice storms. Reliability Engineering and System Safety 2023; 230:108964.

Hou G, Chen S, Bao Y. Development of travel time functions for disrupted urban arterials with microscopic traffic simulation. Physica A: Statistical Mechanics and its Applications 2022; 126961.

Bao Y, Xiang H, Li Y, Hou G. Dynamic effects of turbulent crosswinds on a suspended monorail vehicle–curved bridge coupled system. Journal of Vibration and Control 2022; 28(9–10):1135-1147.

Knight KL, Hou G, Bhaskar AS, Chen S. Assessing the use of dual-drainage modeling to determine the effects of green stormwater infrastructure on roadway flooding and traffic performance. Water 2021; 13(11):1563.

Wu Y, Hou G, Chen S. Post-earthquake resilience assessment and long-term restoration prioritization of transportation network. Reliability Engineering & System Safety 2021; 211:107612.

Hou G, Chen S. Study of work zone traffic safety under adverse driving conditions with a microscopic traffic simulation approach. Accident Analysis & Prevention 2020; 145:105698.

Hou G, Chen S. Probabilistic modeling of disrupted infrastructures due to fallen trees subjected to extreme winds in urban community. Natural Hazards 2020; 102(3):1323–1350.

Hou G, Chen S, Chen F. Framework of simulation-based vehicle safety performance assessment of highway system under hazardous driving conditions. Transportation Research Part C: Emerging Technologies 2019; 105:23–36.

Hou G, Chen S, Han Y. Traffic performance assessment methodology of degraded roadway links following hazards. Journal of Aerospace Engineering 2019; 32(5):04019055.

Hou G, Chen S. An improved cellular automaton model for work zone traffic simulation considering realistic driving behavior. Journal of the Physical Society of Japan 2019; 88(8):084001.

Xiang H, Li Y, Chen S, Hou G. Wind loads of moving vehicle on bridge with solid wind barrier. Engineering structures 2018; 156:188–196.

Hou G, Chen S. Bent connection options for curved and skewed SMC bridges in low-to-moderate seismic regions. Practice Periodical on Structural Design and Construction 2017; 22(4):04017011.

Hou G, Chen S, Zhou Y, Wu J. Framework of microscopic traffic flow simulation on highway infrastructure system under hazardous driving conditions. Sustainable and Resilient Infrastructure 2017; 2(3):136–152.

Chen S, Zhou Y, Wu J, Chen F, Hou G. Research of long-span bridge and traffic system subjected to winds: A system and multi-hazard perspective. International journal of transportation science and technology 2017; 6(3):184–195.

Presentations

Hou G, Muraleetharan KK. Modeling the resilience of power distribution systems against extreme winds by considering falling trees. International Conference on Engineering (ICE 2022), Jaffna, Sri Lanka, 2022.

Hou G, Chen S. Probabilistic modeling of disrupted infrastructures due to fallen urban trees subjected to extreme winds. Department of Civil and Environmental Engineering, Rice University, Houston, TX, 2018.

Hou G, Chen S. Traffic simulation of disrupted transportation systems. Engineering Mechanics Institute Conference (EMI 2017), San Diego, CA, 2017.

Editorships & Editorial Review Boards

Infrastructures, Guest Editor, 2024-2025

Sustainability, Guest Editor, 2022-2023

Peer Reviews

Sustainable and Resilient Infrastructure

Reliability Engineering and System Safety

Thin-Walled Structures

Earthquakes and Structures

Journal of Bridge Engineering

Wind and Structures

Advances in Structural Engineering

Canadian Journal of Civil Engineering

Journal of Traffic and Transportation Engineering

Physica A: Statistical Mechanics and its Applications

Transportation Research Record

Transportmetrica A: Transport Science