

GRADUATE SEMINAR

Multi-Hazard Risks in Coastal Industrial Regions

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Many coastal communities are co-located and intrinsically interwoven with industrial development, including ports, chemical plants, or oil and gas operations. While these industries are often strategically placed along the coast, their positioning alongside neighboring communities leaves them jointly susceptible to severe storm-induced hazards and their compound effects. This presentation poses multi-hazard risk assessment frameworks for a particular piece coastal industrial infrastructure--aboveground storage tanks (ASTs)--and probes the potential for damage, impact of mitigation, and cascading consequences within coastal industrial communities. Aboveground storage tanks offer bulk storage of hazardous materials, including a variety of fuels and chemicals, at industrial sites, and are susceptible to major damage during severe storms (e.g. flotation, overturning, buckling) resulting in spills into the environment or surrounding communities. New models of the fragility of ASTs subjected to multi-hazard storm conditions are proposed, considering storm surge, wave, wind, debris impacts, and rainfall loads. Scenario-based and probabilistic risk assessment frameworks are presented, using a case study in the Houston Ship Channel region. This work uncovers new insights on the viability of procedural, structural and protective mitigation strategies, and enhanced understanding of the factors and conditions that affect risks to industrial infrastructure and surrounding communities in hurricane prone regions.



Jamie E. Padgett is the Stanley C. Moore Endowed Chair and Professor in the Department of Civil and Environmental Engineering at Rice University. Padgett's research focuses on risk assessment of structures and infrastructure, and the subsequent quantification of resilience and sustainability in the face of multiple hazards. Dr. Padgett, Fellow of the Structural Engineering Institute (2020), was the founding Chair of the ASCE/SEI technical committee on Multiple Hazard Mitigation, and currently serves on the leadership of the ASCE Technical Council on Life-Cycle Performance, Safety, Reliability, and Risk of Structural and Infrastructure Systems. She has received several awards and recognitions including EMI Objective Resilience Distinguished Lecturer (2019) and the ASCE Walter L. Huber Civil Engineering Research Prize (2017). Padgett currently serves in leadership roles within the NIST Center of Excellence for Community Disaster Resilience and the NSF NHERI Cyberinfrastructure "DesignSafe-CI".

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