



## DEPARTMENT OF CIVIL ENGINEERING

## SEMINAR

**High-fidelity Hazard Modeling for Enhancing Disaster Resilience****Professor Grace YAN**

Missouri University of Science and Technology, the United States of America

Date: January 9, 2025 (Thursday)

Time: 2:30 p.m. – 3:30 p.m.

Venue: Room 612B, 6/F Haking Wong Building, The University of Hong Kong

**Abstract**

The devastation from recent hurricanes and the related flooding in coastal regions and from tornadoes in Tornado Alley and Southeast of the USA prompted an urgent need in taking proactive actions for enhancing coastal resilience and tornado resilience. To facility this, a tool that can allow stakeholders to perform “what-if” analyses and experiment with potential solutions is needed to expedite the implementation of hazard mitigation and climate adaptation strategies. This requires the proper projection of future natural hazards and of their impact, as well as the understanding of effectiveness of potential hazard mitigation strategies. Dr. Yan will share some of the models her group has developed to contribute to this effort. One is high-fidelity CFD models of tornado-structure interaction for tornado resilience. Dr. Yan’s group took tornado simulation to the next level by combing Could Model 1 (CM1) and CFD to simulate tornado-building interaction and tornado-community interaction at full-scale. The others include models to project future tropical cyclone (TC) activities and to generate future full-track TCs, among others. Through these commitments, Dr Yan’s group has been helping pave the path for communities to THRIVE under the worsening hurricane and tornado hazards.



Fig. 1 A multi-vortex tornado

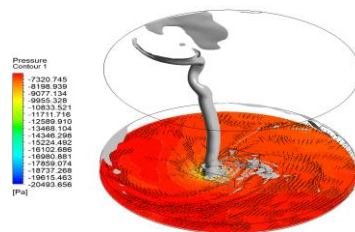


Fig. 2 3D view of simulated tornado using CM1 and CFD

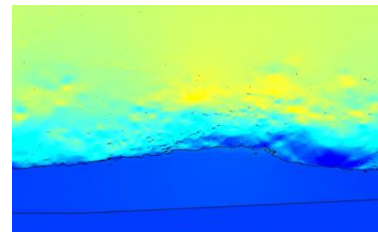


Fig. 3 Multi-phase DNS models for coastal resilience

**About the Speaker**

Grace Yan, an ASCE fellow, is a Professor of Missouri S&T. She is the Director of Center for Hazard Mitigation and Community Resilience, in which 35 faculty members from 12 departments are affiliated. She is also the Director of Wind Hazard Mitigation (WHAM) Laboratory that is home to Sinquefeld Missouri Tornado Simulator Twins. She has been leading interdisciplinary and transdisciplinary research teams in enhancing tornado resilience and coastal resilience, and climate change adaptation. She has published more than 150 refereed journal and conference papers, and secured 38 research grants, with the total amount of \$26M, from NSF, NOAA, DOT, NASA, and other agencies. From the engineering perspective, she simulates different natural hazards (e.g., tornadoes and hurricanes) numerically and experimentally, investigates their actions on built environment, and evaluates vulnerability of communities to natural hazards, as well as develops innovative approaches mitigate and adapt to climate change impacts. She is Chairing of Board of Directors of North American Alliance for Hazards and Disaster Research Institutes since 2021; She is chairing the 15th Americas Conference on Wind Engineering; she is on Board of Directors of American Association of Wind Engineers; She is the Vice-Chair of ASCE Technical Committee of Future Weather and Climate Extremes; She was elected to serve National Academies of Sciences, Engineering, Medicine Committee on Attribution of Extreme Weather and Climate Events and their Impacts in 2024-2026.