Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College *of* Engineering™

Spring 2026 Seminar Series

Seminar Title: *Data-Driven Method for Extreme Wind Characterization: Bridging Extreme Wind Events to Engineering Practice*
Time: 2:00-2:50 PM, Monday, Mar 2, 2026
Location: ECE 101

Speaker:
Guangzhao Chen
Department of Civil Environmental and Construction Engineering, Texas Tech University

Abstract:
Extreme wind hazards are becoming more frequent and intense, driving the push for community resilience. Understanding extreme wind characteristics (including compound wind-driven risks) remains limited, presenting challenges for effective engineering practice. This presentation introduces a research method of **Data Driven Wind Engineering** that seamlessly links real-world hazard observations to engineering practice. This research method outlines a multi-stage framework:
1. **Data Collection** from Direct Observation (e.g., in-situ sensors, remote sensing), Indirect Information (e.g., post damage surveys), and Emulation data (e.g., wind tunnel experiments).
2. **Data Assimilation** techniques to merge heterogeneous datasets and extract the characteristics of extreme wind events.
3. **Modeling Refinement** using the extracted wind characteristics to calibrate numerical models and enhance surrogate models.
4. **Performance-Based Design Translation** to inform resilient structure/infrastructure guidelines and code development under wind hazards.

Through case studies from recent hurricanes and tornado events, this presentation demonstrates how this integrated approach improves predictive accuracy of wind events, accelerates near-surface wind field validation, and drives actionable design strategies. Attendees will learn to leverage diverse wind hazard datasets and advanced analytics to enhance community resilience against extreme wind hazards.

Speaker Bio:
Dr. Guangzhao Chen is an Assistant Professor in the Department of Civil Environmental and Construction Engineering at Texas Tech University. He previously served as a Postdoctoral Researcher at the NHERI Wall of Wind (WOW) Experimental Facility, where he focuses on the design of the National Full Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events (NICHE), the nation's largest full-scale Experimental Facility. Supported by a $12.8 M Mid-Scale Research Infrastructure (MsRI) planning grant and a proposed hundreds-of-million-dollar Major Research Equipment and Facilities Construction (MREFC) award from NSF, he coordinates multiple Physical Design Testbeds to generate the experimental data that underpin NICHE's development. He earned his Ph.D. in Civil (Structural) Engineering from the University of Illinois Urbana-Champaign, specializing in wind hazards and their effects on structures and infrastructure supported by the NSF, NIST, and NOAA grants. Dr. Guangzhao Chen is passionate about interdisciplinary collaboration, bridging structural engineering, atmospheric science, experimental facilities, AI and ML technologies, and social sciences, to advance resilient design frameworks and innovate teaching methodologies.