AI-Empowered Performance-Based Wind Engineering

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Abstract:

Recent advancements in performance-based wind engineering have placed new demands on wind characterization (e.g., duration consideration), aerodynamics modeling (e.g., transient feature) and structural analysis (e.g., nonlinear response). While conventional approaches in computational and experimental wind engineering provide valuable tools to overcome many of these emerging challenges, noticeable increase in use of artificial intelligence (AI) suggests its great promise in facilitating the implementation of performance-based wind design methodology. This talk will discuss state-of-the-art machine learning tools (e.g., knowledge-enhanced deep learning and deep reinforcement learning) that are successfully applied to wind climate analysis, transient aerodynamics, nonlinear structural dynamics, shape optimization and vibration control. The final part of this talk will extend the application of AI tools to enhance the coastal city resilience under hurricane hazards (wind, rain, and surge).

Bio:

Dr. Teng Wu received his Ph.D. degree from University of Notre Dame in 2013. He is currently an Associate Professor in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo (UB). Wu's research interest is the development of analytical and computational methods focusing on nonlinear and transient structural aerodynamics, performance-based wind design, and community resilience to hurricane (wind, rain and surge hazards).

His contributions have been recognized through the 2013 American Society of Civil Engineers (ASCE) O.H. Ammann Research Fellowship, 2014 American Association for Wind Engineering (AAWE) Best Paper Award, 2016 ASCE Alfred Noble Prize, 2017 AAWE Robert Scanlan Award, 2017 International Association for Wind Engineering (IAWE) Junior Award and 2018 International Association for Bridge and Structural Engineering (IABSE) Prize. Wu currently serves as the Associate Editor of ASCE Journal of Bridge Engineering, IABSE Structural Engineering International, Frontiers in Built Environment-Wind Engineering and Science, and Intelligent Transportation Infrastructure. He is an executive board member of IAWE and a member of AAWE board of directors.

Monday, April 24th, 2023   4:00 – 5:20 p.m.

1310 Yeh Student Center