



Civil and Environmental Engineering Department Seminar

DR. WEI ZHANG

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Date: Friday, April 14, 12:45pm – 2:00pm

NEW Location: Bingham Bldg., Vose Room #240

Lunch discussion will start at 12:00pm in Vose Room #138

Remote Access:

Meeting ID: 925 0263 5986 **Passcode:** 151477

<https://cwru.zoom.us/j/92502635986?pwd=dkZEMWVocGZWL0UvQlJudlM4bH15Zz09>

Unravel Complex Flow Physics for Wind Resilience and Sustainability

Abstract: We are facing a wide range of grand challenges worldwide, such as the continuous increase of energy demand, aging population and civil infrastructure, and more frequent extreme weather and climate conditions. Improving understanding of complex flow physics involved in these high-impact societal challenges is crucial to seek viable solutions. This talk will first present the ongoing efforts in wind resilience of low-rise buildings, covering 1) wind-tunnel testing of conical vortex dynamics, and 2) development of fractal porous parapets inspired by Nature to suppress rooftop vortices, thus mitigating the worst peak suctions. The ultimate goal is to create cost-effective bio-inspired flow control strategies to enhance low-rise buildings' resilience in high-speed winds, such as hurricanes and tornadoes. Then wind energy for sustainability will be discussed by showing experimental results of wind turbine swirling near wake, tip-vortices, enhanced turbulence and their implication to Computational Fluid Dynamics (CFD) modeling. Large wind farms affect surface heat flux, depending on the aligned or staggered layout choices, indicating a potential impact on the local environment. A synergy of laboratory experiments, numerical modeling, and full-scale field measurements will be pursued to unravel complex flow physics for wind resilience and sustainability.



Speaker Bio: Dr. Wei Zhang is an associate professor at the Mechanical Engineering Department, the Cleveland State University. She leads the Experimental Flow Control and Wind Engineering lab and serves as the co-director of the Center for Integrated modeling for Energy, Resiliency, and Sustainability. Dr. Zhang earned her Ph.D. in Mechanical Engineering (specialty: Fluid Engineering and Thermo-physics) from Xi'an Jiaotong University, China. Her scholarly activities are in fundamental fluid mechanics of turbulent wakes, bio-inspired flow control and applications in wind hazard mitigation and wind energy aerodynamics.