

Abstract Submitted  
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**An Experimental Investigation on the Wake Interference of Multiple Wind Turbines over Complex Terrains** HUI HU, ZIFENG YANG, AHMET OZBAY, PARTHA SARKAR, Iowa State University — We report an experimental study to investigate the wake interferences of multiple wind turbines sited over complex terrains in order to elucidate underlying physics to explore/optimize design paradigms of wind turbines sited over complex terrains for higher power yield and better durability. The experiments were conducted in a wind tunnel with an array of wind turbine models sited over a flat (baseline case) and complex terrains with non-homogenous surface winds. In addition to measuring dynamic wind loads (both forces and moments) and the power outputs of the wind turbine models, advanced flow diagnostic techniques such as digital Particle Image Velocimetry (PIV) will be used to conduct detailed flow field measurements to quantify the flow characteristics of the surface winds and wake interferences among multiple wind turbines over flat (baseline case) and complex terrains. The detailed flow field measurements were correlated with the wind load measurements to elucidate the underlying physics associated with turbine power generation and fatigue loads acting on wind turbines.

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