

Abstract Submitted  
for the DFD19 Meeting of  
The American Physical Society

**Effects of Land Cover on Wind Profiles: Case Study at Kirkwood Iowa.** ROBERT AHLMAN, WEI ZHANG, Cleveland State University, COREY D. MARKFORT, University of Iowa — The atmospheric boundary layer serves as the incoming flow and kinetic energy source for wind turbines and remains a particularly challenging flow to study in fluid dynamics research. The difficulty lies in not only the wide range of spatial and temporal turbulent scales that need to be resolved but also the effects of the underlying surface. In particular, it is not well understood how wind velocity profiles respond to complex terrain and variations in atmospheric thermal stability. This research aims to characterize wind profiles in the surface layer and assess the accuracy of commonly used metrics for various terrain and thermal stability conditions. Data sets were recorded by various instruments mounted on a 106-meter tall meteorological tower at the Kirkwood Community College in Cedar Rapids, Iowa. Vertical profiles of wind speed and temperature, filtered by the direction of the incoming wind, for an entire year have been analyzed. Standard metrics and well-established formulations were assessed for their ability to accurately describe the wind profiles for a variety of different conditions. This work helps to provide insights into the effects of complex terrain and the atmospheric thermal stability on wind profiles, crucial to onshore wind resource assessment.

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Date submitted: 17 Sep 2019

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