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RENEWABLE AND SUSTAINABLE ENERGY INSTITUTE

# BIG energy seminar series

Addressing global energy challenges in scale and complexity.

## *Testing wake steering wind farm control by simulation, wind tunnel and open-field experiments*


# Martin Kuhn

**Professor at the Center of Wind Energy Research, Carl von Ossietzky University Oldenburg, Germany**


**Date:** March 10, 2023 11:00 AM – 12:30 PM
**Location**: Engineering Building ECNW 312 or ZOOM: https://cuboulder.zoom.us/j/99654274989


**Abstract:** Wind turbines operating in the wake of upstream turbines experience significant power losses due to wake effects. The overall power output of wind farms can be increased by applying wake steering control to deflect the wake of upstream turbines by intentionally introducing a yaw misalignment with respect to the incoming wind direction. However, the complex nature of wake steering in real environments makes it difficult to fully understand the performance of a yaw controller and how it performs with dynamic, varying inflow conditions, such as the wind direction. The presentation will address how wake steering wind farm control can be systematically developed and tested by combining large-eddy simulations, wind tunnel experiments emulating wind direction changes and open-field experiments on two utility-scale wind turbines.


**Bio:** Martin Kühn studied Mechanical Engineering and Physical Engineering at Hanover, Berlin, Germany and Delft, the Netherlands. In the 1990s, he worked as a researcher at TU Delft where he completed a ground-breaking PhD on dynamics and design optimization of offshore wind turbines. During five years affiliated with a multinational OEM, he acted as engineering project manager for two early offshore wind farms in Sweden and Ireland. Since 2004 he has been a full professor of wind energy systems, first at Stuttgart University and currently For Wind – Center of Wind Energy Research, Carl von Ossietzky University Oldenburg, Germany. His research interests cover control and load monitoring of wind turbines and wind farms, in-field measurement techniques, incl. lidar sensing of wind farm flow, dynamics, and design of wind energy systems.

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