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and Computer Science

UTD WIND
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THE UNIVERSITY OF TEXAS AT DALLAS

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Johan Meyers is a professor of Mechanical Engineering at KU Leuven since 2009. His research focuses on the simulation of turbulent flows and the atmospheric boundary layer with applications in wind energy. JM obtained a PhD in 2004 at KU Leuven, was a postdoctoral researcher at Univ. Paris 6, and a postdoctoral research fellow of the Science Foundation Flanders. In 2012, he obtained an ERC grant on wind-farm control, and since then he has been involved in various European projects on wind energy. Currently, JM serves as the president of the European Academy of Wind Energy, and he is also active as an associate editor for Wind Energy Science.

Large-eddy simulation for wind-farm applications

In the last decade, large-eddy simulations (LES) have evolved into a high-fidelity testing environment that has been instrumental in better understanding the interactions between the atmospheric boundary layer and large wind farms. In the current talk, a number of recent developments in LES for wind-farm applications are presented. First, a recent validation of our simulation code SP-Wind is discussed based on a detailed SCADA, lidar and load measurement campaign in the Lillgrund wind farm. Next, the prospect of using LES as a real-time flow model for wind-farm applications is discussed. It is shown that coarse-grid LES can produce accurate flow predictions over time horizons up to 30min, while being two orders of magnitude faster than real time. Finally, state-estimation in LES based on lidar measurements is discussed, for which Bayesian inference and 4-DVar are used.

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