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Optimal Coordination of Wind Turbines in a Wind Farm

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Date: Monday, July 2 at 2pm

Location: [Onizuka Conference Room \(ECAE 199\)](#)

Abstract:

Wind energy has been growing rapidly in recent decades, and it is currently the main alternative energy source. In order to reduce construction, maintenance and commissioning costs, wind energy production is typically organized in wind farms rather than single isolated wind turbines, leading to wake interactions among different turbines, which can lead to power losses and increased structural loads. Traditionally, these interactions have been neglected by wind farm controllers, and each wind turbine has been optimizing its own performance. However, as it has been shown in recent years, a coordinated wind turbine operation can significantly improve the wind farm performance, resulting in a lower cost of energy and better grid integration.

This talk will focus on control concepts for optimal coordination of wind turbines in a wind farm. Different wake control strategies, i.e. wind farm actuators suitable for achieving the set objectives will be explained, and it will be shown how they can be exploited in control algorithms. An optimal control framework based on the adjoint-based model predictive control will be introduced. A special care will be given to the control solutions addressing the main physical phenomena in wind farms, such as time delays due to the wake propagation, high non-linearity and resulting computational complexity of the MPC algorithms. The model predictive control will be compared with simpler model free wind farm control approaches.

Bio:

Vlaho Petrović received his PhD degree in Electrical Engineering from University of Zagreb, Faculty of Electrical Engineering and Computing. Currently, he is a postdoc at ForWind, University of Oldenburg, leading a team with a strong focus on wind turbine and wind farm control, and wind tunnel experiments. His research interests include optimal and predictive control, and system identification.

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