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Identification of clusters of turbines in waked conditions through SCADA data[1] FEDERICO BERNARDONI, UMBERTO CIRI, MARIO ROTEA, STEFANO LEONARDI, Department of Mechanical Engineering, University of Texas at Dallas — Control algorithms seeking to maximize the power production of wind farms assume that clusters of turbines in waked conditions are known. However, the wind changes direction and the clusters within the array vary continuously. In a practical application, one would need to identify the clusters in real time and then control the turbines with a coordinated approach. Identifying the clusters may be challenging for several reasons such as absence of a meteorological tower, misalignment between the turbines and the actual wind direction or flow variability due to topography or meso-scale coherent structures. In this contribution we propose a technique to identify clusters of turbines correlating power production and angular speed of the turbines. The technique is demonstrated in an ideal 4x4 wind turbine array. Results from large-eddy simulations with rotating actuator disk are used to mimic SCADA data and assess the proposed algorithm under different wind directions. The goal is to provide a tool to be integrated in the control system of operating and future wind farms.

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