Combined Active and Reactive Power Control of Wind Farms based on Model Predictive Control - DTU Orbit (21/05/2019)

**Combined Active and Reactive Power Control of Wind Farms based on Model Predictive Control**

This paper proposes a combined wind farm controller based on Model Predictive Control (MPC). Compared with the conventional decoupled active and reactive power control, the proposed control scheme considers the significant impact of active power on voltage variations due to the low X=R ratio of wind farm collector systems. The voltage control is improved. Besides, by coordination of active and reactive power, the Var capacity is optimized to prevent potential failures due to Var shortage, especially when the wind farm operates close to its full load. An analytical method is used to calculate the sensitivity coefficients to improve the computation efficiency and overcome the convergence problem. Two control modes are designed for both normal and emergency conditions. A wind farm with 20 wind turbines was used to verify the proposed combined control scheme.

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