Enhanced Voltage Control of VSC-HVDC Connected Offshore Wind Farms Based on Model Predictive Control - DTU Orbit (06/12/2018)

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This paper proposes an enhanced voltage control strategy (EVCS) based on model predictive control (MPC) for voltage source converter based high voltage direct current (VSC-HVDC) connected offshore wind farms (OWFs). In the proposed MPC based EVCS, all wind turbine generators (WTGs) as well as the wind farm side VSC are optimally coordinated to keep voltages within the feasible range and reduce system power losses. Considering the high ratio of the OWF collector system, the effects of active power outputs of WTGs on voltage control are also taken into consideration. The predictive model of VSC with a typical cascaded control structure is derived in details. The sensitivity coefficients are calculated by an analytical method to improve the computational efficiency. A VSC-HVDC connected OWF with 64 WTGs was used to validate the proposed voltage control strategy.

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