Advanced Control Strategy of DFIG Wind Turbines for Power System Fault Ride Through - DTU Orbit (14/12/2018)

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This paper presents an advanced control strategy for the rotor and grid side converters of the doubly fed induction generator (DFIG) based wind turbine (WT) to enhance the low-voltage ride-through (LVRT) capability according to the grid connection requirement. Within the new control strategy, the rotor side controller can convert the imbalanced power into the kinetic energy of the WT by increasing its rotor speed, when a low voltage due to a grid fault occurs at, e.g., the point of common coupling (PCC). The proposed grid side control scheme introduces a compensation term reflecting the instantaneous DC-link current of the rotor side converter in order to smooth the DC-link voltage fluctuations during the grid fault. A major difference from other methods is that the proposed control strategy can absorb the additional kinetic energy during the fault conditions, and significantly reduce the oscillations in the stator and rotor currents and the DC bus voltage. The effectiveness of the proposed control strategy has been demonstrated through various simulation cases. Compared with conventional crowbar protection, the proposed control method can not only improve the LVRT capability of the DFIG WT, but also help maintaining continuous active and reactive power control of the DFIG during the grid faults.

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