

Low voltage ride-through in DFIG wind generators by controlling the rotor current without crowbars

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Abstract-

Among all the different types of electric wind generators, those that are based on doubly fed induction generators, or DFIG technology, are the most vulnerable to grid faults such as voltage sags. This paper proposes a new control strategy for this type of wind generator, that allows these devices to withstand the effects of a voltage sag while following the new requirements imposed by grid operators. This new control strategy makes the use of complementary devices such as crowbars unnecessary, as it greatly reduces the value of currents originated by the fault. This ensures less costly designs for the rotor systems as well as a more economic sizing of the necessary power electronics. The strategy described here uses an electric generator model based on space-phasor theory that provides a direct control over the position of the rotor magnetic flux. Controlling the rotor magnetic flux has a direct influence on the rest of the electrical variables enabling the machine to evolve to a desired work point during the transient imposed by the grid disturbance. Simulation studies have been carried out, as well as test bench trials, in order to prove the viability and functionality of the proposed control strategy.

Index Terms- DFIG wind generators; Low voltage ride through (LVRT) capability; Voltage dip; Voltage sag

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