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Modeling and Control of the Wind Energy Conversion Systems Based on DFIG Under Sub- and Super-Synchronous Operation Modes

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Abstract: In this work, the modeling and control of the Wind Energy Conversion Systems (WECS) based on doubly fed induction generator (DFIG) are presented. Firstly, we developed the models of the different elements of the conversion chain. After, we consider the vector control strategy of the active and reactive powers in order to ensure an optimum operation. Finally, the dynamic model of a DFIG and wind turbine grid connected system is determined in the dq-synchronous reference frame. The numerical simulation results obtained with Matlab/Simulink software present the behaviors of the sub-synchronous and super-synchronous operation modes.

Keywords : wind power generation, doubly fed induction generator, renewable energy, modeling, control.