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Real Time Implementation of Efficient DFIG-Variable Speed Wind Turbine Control

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Abstract : In this paper, design and experimental study based on Direct Power Control (DPC) of DFIG is proposed for Stand-alone mode in Variable Speed Wind Energy Conversion System (VS-WECS). The proposed IDPC method based on robust IP (Integral-Proportional) controllers in order to control the Rotor Side Converter (RSC) by the means of the rotor current d-q axes components (Ird* and Irq*) of Doubly Fed Induction Generator (DFIG) through AC-DC-AC converter. The implementation is realized using dSPACE dS1103 card under Sub and Super-synchronous operations (means < and > of the synchronous speed “1500 rpm”). Finally, experimental results demonstrate that the proposed control using IP provides improved dynamic responses, and decoupled control of the wind turbine has driven DFIG with high performances (good reference tracking, short response time and low power error) despite for sudden variation of wind speed and rotor references currents.

Keywords : Direct Power Control (DPC), Doubly fed induction generator (DFIG), Wind Energy Conversion System (WECS), Experimental study.
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