Real Time Implementation of Grid Connected Wind Energy Systems: Predictive Current Controller

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Abstract : This work, suggests a new control strategy usingFinite-Control-Set Model-Predictive-Control (FCS-MPC) for thecontrol of a wind turbine system (WTS) based on PermanentMagnet Synchronous Generator (PMSG). The consideredcontroller is separated on two parts: FCS-MPC-based on thecurrent control loop for the single switch mode rectifier tooptimally release the maximum wind power, and FCS-MPCbased on the voltage control loop for the voltage source inverterto enhance the THD of grid currents. A wind energy systemprototyping platform was developed and accomplished in thelaboratory, and the experimental results are provided to verifythe performances of the considered FCS-MPC strategies.

Keywords : Finite-Control-Set Model-Predictive-Control (FCSMPC), Permanent Magnet Synchronous Generator (PMSG), Wind Turbine System (WTS), Maximum Power Point Tracking (MPPT), Grid Connected, Experimental Results