

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

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**Abstract :** This work, suggests a new control strategy using Finite-Control-Set Model-Predictive-Control (FCS-MPC) for the control of a wind turbine system (WTS) based on Permanent Magnet Synchronous Generator (PMSG). The considered controller is separated on two parts: FCS-MPC-based on the current control loop for the single switch mode rectifier to optimally release the maximum wind power, and FCS-MPC-based on the voltage control loop for the voltage source inverter to enhance the THD of grid currents. A wind energy system prototyping platform was developed and accomplished in the laboratory, and the experimental results are provided to verify the 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