## Predictive Control of Power Electronics Converters in Wind Energy Systems

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**Abstract :** In order to make a wind power generation truly costeffective and reliable, an advanced control techniques must beused. In this paper, we develop a new control strategy using Model Predictive Control (MPC) approach for permanentmagnet synchronous generator based wind turbine system. The proposed control law is based on two points: MPC-based torquecurrent control loop for the generator-side converter to reach the maximum power point of the wind turbine, and MPC-based current control loop for the grid-side converter to satisfy the gridcode and to help improve system stability. A small-scale wind turbine system prototype was built and tested in the laboratory, and the experimental results are provided to verify the validity of the developed control methods, MPPT algorithm and performance of the system operations.

**Keywords:** finite-set model predictive control (FSMPC), Permanent Magnet Synchronous Generator (PMSG), Wind Energy Conversion System (WECS), Maximum Power Point Tracking (MPPT) Control, Grid Connected, experimental validation