Control of Grid Connected PMSG-Based Wind Turbine System with Back-To-Back Converter Topology Using Resonant Controller

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Abstract : This paper presents modeling and control strategy for the grid connected wind turbine system based on Permanent Magnet Synchronous Generator (PMSG). The considered system is based on back-to-back converter topology. The Grid Side Converter (GSC) achieves the DC bus voltage control and unity power factor. The Machine Side Converter (MSC) assures the PMSG speed control. The PMSG is used as a variable speed generator and connected directly to the turbine without gearbox. The pitch angle control is not either considered in this study. Further, Optimal Tip Speed Ratio (OTSR) based MPPT control strategy is used to ensure the most energy efficiency whatever the wind speed variations. A filter (L) is put between the GSC and the grid to reduce current ripple and to improve the injected power quality. The proposed grid connected wind system is built under MATLAB/Simulink environment. The simulation results show the feasibility of the proposed topology and performance of its control strategies.