

Abstract

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Power Management of Open Winding PM Synchronous Generator for Unbalanced Voltage Conditions

Wind energy is currently the fastest growing electricity source worldwide. Since wind generators have to compete with other energy sources, their cost efficiency is effective. In this thesis, a system utilizing an open-winding Permanent Magnet Synchronous Generator (PMSG) is studied for wind energy generation. The proposed system controls generated power using an auxiliary voltage source inverter. The volt ampere (VA) rating of the auxiliary inverter is only a fraction of the system rated power. An adjusted control system, which consists of two main parts, the first is implemented to control the generator power and the second is control the active and the reactive power injected into the grid. Balanced and unbalanced voltage effects are studied for the wind generation model. Theoretical and experimental results are demonstrated which verify the validity of the proposed system to achieve the power management requirements for balanced and unbalanced voltage condition of the grid. The proposed system is designed and simulated utilizing MATLAB /Simulink software.