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 paper, 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 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, is implemented to control the generator power and the grid-side converter. This paper introduces a study for the effect of unbalanced voltages for the wind generation system. The proposed system is designed and simulated utilizing MATLAB /Simulink software. 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.