



Modeling and Operation of Permanent Magnet Synchronous Generator Wind Energy Conversion System Connected with Grid

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Abstract:

Wind is one of the most distinguished renewable sources of energy. Wind Energy Conversion System (WECS) is based on a variable speed wind turbine with direct driven Permanent Magnet Synchronous Generator (PMSG). WECS transmits its electrical power to an AC grid using advanced power electronic converter system. The modelling and operation of a grid connected wind generation system based on a gearless PMSG is being studied. Implementation of the machine side converter control strategy develop a maximum power point tracking (MPPT) method using direct driven PMSG. The grid side converter is used to control active and reactive powers injected into the grid and maintaining the dc link voltage constant. The PMSG is connected to the grid by means of a fully controlled back-to-back converter with a voltage source inverter (VSI) which consists of a pulse width modulation (PWM) and an intermediate DC link circuit. DC-Link Over-Voltage protection Scheme is used to protect the system under fault conditions. The effect of change wind speed and faults on the operation is being studied in this paper. The modeling of wind power generation system with PMSG and power electronic converter interface along with the control scheme is implemented using a MATLAB/SIMULINK simulation package.

Keywords:

Permanent Magnet Synchronous Generator (PMSG), WECS, Fully controlled back-to-back converter, PWM, Voltage Source Inverter, MPPT

Published In:

17th International Middle East Power Systems Conference . . .