



Analysis of Wind Turbine Driven Permanent Magnet Synchronous Generator under Different Loading Conditions

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Abstract:

This paper proposes the configuration of a wind turbine generating system equipped with Permanent Magnet Synchronous Generator (PMSG). There are different types of synchronous generators, but the PMSG is chosen which has better performance due to higher efficiency and less maintenance. Since it can be used without a gearbox also implies a reduction of the weight of the nacelle and a reduction of costs. The model includes a wind turbine model, drive train model and PMSG model. The equations that explain their behavior have been introduced. The generator model is established in the d-q synchronous rotating reference frame. The proposed Wind Turbine Generator System (WTGS) has been implemented in Matlab/Simulink software. The PMSG is operating in stand-alone which is loaded with different types of loads. The simulation results indicate the ability of wind driven PMSG to operate over wide range of operating conditions at different loading conditions and show effect of different load types in operation.

Keywords:

Permanent Magnet Synchronous Generator (PMSG), Wind Turbine, Wind Energy and WTGS

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