World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:11, No:11, 2017

A Review on Control of a Grid Connected Permanent Magnet Synchronous Generator Based Variable Speed Wind Turbine

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Abstract : Among all available wind energy conversion systems (WECS), the direct driven permanent magnet synchronous generator integrated with power electronic interfaces is becoming popular due to its capability of extracting optimal energy capture, reduced mechanical stresses, no need to external excitation current, meaning less losses, and more compact size. Simple structure, low maintenance cost; and its decoupling control performance is much less sensitive to the parameter variations of the generator. This paper attempts to present a review of the control and optimization strategies of WECS based on permanent magnet synchronous generator (PMSG) and overview the most recent research trends in this field. The main aims of this review include; the generalized overall WECS starting from turbines, generators, and control strategies including converters, maximum power point tracking (MPPT), ending with DC-link control. The optimization methods of the controller parameters necessary to guarantee the operation of the system efficiently and safely, especially when connected to the power grid are also presented.

Keywords : control and optimization techniques, permanent magnet synchronous generator, variable speed wind turbines, wind energy conversion system
Conference Title : ICSEE 2017 : International Conference on Sustainable Energy Engineering
Conference Location : Venice, Italy
Conference Dates : November 13-14, 2017