

# Abstract

There are many loads (such as remote villages, islands, ships etc) which are away from the main grid and require stand-alone generator system (which can provide constant nominal voltage and frequency) to provide for their local electrification. The natural characteristics of nearly all prime movers (such as wind turbine, diesel turbine etc) is that their speed varies depending on the driving torque. Therefore any generation system coupled to such prime movers should have the capability to ensure constant voltage and frequency irrespective of the speed variation of the prime mover. This will enable optimum system operation under different load conditions. To fulfill this requirement stand-alone generator system with doubly-fed configuration of wound rotor induction provides a viable solution and is therefore chosen for the present work. A novel control strategy for control of stand-alone generation system is proposed and tested experimentally.

One of the problems in stand-alone generation is the initial power source for providing the excitation to the machine. In the present work two novel methods have been proposed which can act as good solution.

One of the other issues in the operation of a stand-alone generating system is the quality of output power. In this thesis, a control scheme is proposed in which the concept of active filter can be incorporated with the stand-alone generator control to address some of the power quality problems. This has been implemented and verified.