Wind Power Generation

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Abstract

Wind power generation elements including wind turbine, wind generators, gear box, pitch control, and yaw control are discussed in this article with emphasis on grid-connected devices. To realize a feasible wind power scheme, real-life implementation problems are also discussed. The objective of the paper is to develop end user understanding by utilizing analogies and simple language.

Keywords: wind power generation, gear box, pitch control.

1. Introduction

With ever-increasing power demand, there is a strong interest in creating renewable energy and growing attempts to conserve energy [1]. This is why technological study is aimed at the use of wind energy. Figure 1a shows the rapid increase of wind power use as more technological breakthroughs are achieved. Figure 1b shows major manufacturers of wind power systems of the 2008 installed capacity of 28.190 GW [2].

2. Working

The generator can produce power at sub-synchronous speeds [3]. This is done by the action of the drive that will make the network seem to be running at a lower frequency. The use of the drive is very important to realize variable speed wind power generation. Without such devices, the squirrel cage induction generator will generate power only when the generator rotor is rotated above synchronous speed; and if the wind speed is low, the generator will act as motor consuming instead of producing electric power. It has to be noted that the drive in this case should be rated for 100% of the generator. This is compared with only 30% of the doubly fed induction generator mentioned below [4]. The squirrel induction wind generator coupled with a drive. The wind generator induced by the squirrel cage. 2. Wound Rotor Induction Generator (Doubly Fed): This is an exciting generator form in which the stator and rotor can provide energy at certain speeds concurrently. The rotor is connected to the drive while the stator terminal is directly connected to the grid or network. Since the stator is directly attached to the grid, the velocity of rotation of the magnetic field is set in the windings of the stator. The role of rotor side drive is to adjust the rotation of the rotor's magnetic field to suit the one of the stator [5]. This is exactly the operation principle of a synchronous generator where there is no slip between rotation of the stator and rotor magnetic field.

Result and conclusion

Although, compared to fossil fuel or nuclear power, wind power suffers from low reliability, its primary benefit is renewability and environmental recognition. With the latest developments in technology for blade, engine, generator and electronics, wind power can play an even greater part in offering clean energy.

Reference

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