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Wind Farm System: Literature Survey

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***Abstract*—With increased wind power capacity, transmission system operators have become more concerned about the power quality; reliability and reactive power management of Grid connected wind farms and have issued grid codes. The major concerns and issues highlighted in grid code are active, reactive power control and power quality. In India the majority of wind farms are in rural area. Increasing size of wind farm connected to grid will lead to various challenges such as power quality, security and reactive power control during normal operation, and fault ride through capability during fault conditions. Considering the challenges to be faced related to interfacing of large wind farms using Induction and Synchronous generators, it is necessary to study the various power quality, stability and reactive power requirement of large-scale wind farm connected to grid and provide cost effective solution for management of power quality and reactive power. Overviews of literature survey on Power Quality and Reactive Power Management Of Grid Connected Wind Farm are discussed.**

***Index Terms*—Wind Farm, Wind Generator, Power Quality issues, Power Quality and Reactive Power Management.**

I. INTRODUCTION

Wind electricity installed capacity in India is around 8757.2 MW till March 31st 2008 and gross potential is 45,000 MW. Though India ranks 4th globally, the country managed to register a growth rate of just 25.2 % against the world average of 26.6%. This puts India far behind countries like the Germany, US, Spain, China. Wind generation installed capacity in Maharashtra state is 1,755.9 MW and a gross potential is 3,650 MW. It ranks 2nd after Tamil Nadu having capacity 3,873.4 MW in India. Today India is a major player in the global wind energy.

Considering the increasing share of wind generation interfaced to grid it is necessary to study the power quality and reactive power issues considering voltage quality and stability issues. In case of Induction type wind energy converter reactive power management in cost effective way is essential.

II. LITERATURE SURVEY

In reference [1], presents a method for the steady state analysis of self-excited induction generators using balanced terminal capacitors. The operating characteristics are governed by the magnetic saturation in the machine. Saturation has been incorporated by the use of experimental data, which indicate the variation in magnetizing reactance with air gap flux. Operational and steady state equivalent circuits of the induction machine are employed to predict the steady state performance under different load conditions. The analytical procedure and the related computer program are described in the paper. Simulated results are presented and compared with corresponding results obtained experimentally and a reasonable correlation has been observed.

In reference[2], discussed the capacitance requirements for isolated self-excited induction generators. It is concluded that the steady state as well as operational equivalent circuit methods give same value of the terminal capacitance required to maintain self-excitation under steady state operation. No load terminal capacitances requirements can be estimated by the analytical method proposed and give good agreement with the experimental measurements. Simplified no load model can be used to predict the performances of the self-excited induction generator with good accuracy. The influence of load impedances and its power factor on the terminal capacitance required to maintain self-excitation under steady state is also examined. Also it is concluded that the terminal capacitance required for a loaded machine is significantly higher than the corresponding no load values. It is affected by load impedance, its power factor and machine speed. The maximum power output from an isolated self-excited generator depends upon the terminal capacitances and the machine speed.

In reference [3], presents an accurate method of analysis to predict the steady state performance characteristics of a three-phase isolated induction generator self excited with