

DFIG in a Wind Farm

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ABSTRACT

Considering the rate at which conventional sources are being consumed and their impact on environments it is necessary to adopt alternate energy technologies for sustainable development. Out of various renewable energy sources, wind generation is most cost effective in addition to its various advantages. Worldwide the share of wind generation connected to grid is increasing at faster rate and in near future will become one of the major sources of renewable energy. With rapid development of wind power technologies and significant growth of wind power capacity installed worldwide, various wind turbine concepts have been developed. 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. This paper will describe the sustainability of Doubly-Fed Induction Generator during the abnormal condition on grid also during the fault condition. For the selection of the suitable ratings of crowbar approximations are to be carried out. For simulation studies taking wind speed variations into account, or when the rotor shaft speed deviation becomes significant, the turbine's speed and its pitch control systems have to be considered. The short-circuit current contribution of DFIG has received much attention. Wind turbines with a doubly fed induction generator have a crowbar to protect the power electronic converter that is connected to the rotor windings of the induction generator. A Grid fault ride through capability of Doubly Fed Induction Generator in Wind Energy Transfer System is determined using PSCAD Software Simulation. DFIG Rotor side converter is very much sensitive to Grid Fault. A single line to ground fault at grid is taken for study. Voltage dip occur on stator voltage and current rises instantaneously, with this rotor side current increased which will result in damage of rotor side converter.

Keywords: Wind Farm, PSCAD, Doubly-fed induction generator (DFIG), flux linkage, grid fault, protection.

I. INTRODUCTION

As compared to develop countries Indian Grid system is very weak also having poor infrastructure. The percentage of wind-based generation will increase at faster rate, which will results into the impact on the power quality and reactive power management of large wind farm comprising of Synchronous and Induction generator.

There is need to study effect of these factors to identify the main issues which are responsible for deterioration of power quality, reliability, security and stability of large wind farm grid. Hence, it is necessary to address these issues including stability and reliability of grid as well as satisfactory operation of generator including ride

through capability during normal as well as fault conditions.

The past decade has seen the emergence of wind as the world's most dynamically growing energy source. With the increasing share of wind in power generation, the dynamic behaviour of the power system will change considerably due to different technologies used for wind and conventional generators. Therefore, WTs and wind parks have to be considered in power system dynamic stability studies for which, however, suitable WT models are needed. These models have to compromise between accuracy, for considering relevant dynamic interactions between grid and WT, and simplicity required for the simulation of large systems. WT modelling is a topical research currently conducted