

A Study to Design and Implementation of an 11 Level Inverter with FACTS Capability for Distributed Renewable Energy systems

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Abstract

This paper presents, a single phase wind energy inverter (WEI) system having multilevel features with flexible AC transmission capability. The goal of this paper is to design a type of inverter with distribution static synchronous compensator (D-STATCOM) option to provide utilities with more control the power factor (PF) of distribution lines. The proposed inverter is placed between the wind turbine and grid, as regular WEI in order to regulate active and reactive power transferred to the grid, regardless of wind speed. With the help of this proposed inverter for small to medium size wind applications will eliminate the use of condenser banks as well as FACT devices to control the power factor (PF) of grid at target value, by regulating active and reactive power required by the distribution lines. The purpose of this paper is to present an idea to extend the penetration of renewable energy systems into distribution systems. In this D-STATCOM inverter modular multilevel converter topology is used, and in order to control active and reactive power by regulating the power angle and modulation index as per the requirement of distribution lines. our motive is to reduce the overall cost of system and total harmonic distortion (THD) and significantly trying to increase the efficiency of system by reducing the number of switches during designing of system .The simulation for this multilevel inverter proposed to be done by using MATLAB /SIMULINK .

Keywords: Distribution static synchronous compensator (D-STATCOM), Power Factor (PF), Power Quality (PQ), Modular multilevel converter (MMC), multilevel inverter (MLI), wind energy inverter (WEI) ,Distributed Generator(DG).