



# Design and implementation of a Multilevel Inverter for Wind Energy

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## ABSTRACT

*In this paper a new three phase wind energy based multilevel inverter is presented. The proposed inverter is placed between the wind turbine and the grid, and is able to regulate active and reactive power transferred to the grid. This Wind Energy is equipped with inverter in order to reduce the harmonics of the local feeder lines. Using the proposed inverter for small-to medium-size wind applications will eliminate the use of the capacitor banks as well as FACTS devices as it reduce harmonics of the distribution lines. The goal of the paper is to introduce different ways to increase the penetration of the renewable energy systems into the distribution systems. This will encourage the utilities and customers to act not only as a consumer, but also as a supplier of energy. Moreover, using the new types of converters with compensation capabilities will significantly reduce the total cost of the renewable energy applications. The function of the proposed inverter is to transfer active power to the grid of the local power lines regardless of the incoming active power from the wind turbine.*

**KEY WORDS:** Multilevel Inverter, Harmonics, Pulse Width Modulation.

## 1. INTRODUCTION:

The role of power electronics in distribution system has greatly increased recently. The power electronics devices are usually used to convert the non-conventional forms of energy to the suitable energy for grid, in terms of voltage and frequency, in permanent magnet (PM) wind applications, a back-to-back converter is normally utilized to connect the generator to the grid. A rectifier converts the output power of the wind of the wind turbine to a DC power. The DC power is then converted to the desired AC power for power lines using an inverter and a

transformer. With a recent development in wind energy, utilizing smarter wind energy inverters (WEIs) has become an important issue. There are a lot of single-phase lines in United States, which power small-to-medium-size wind turbine. Increasing the number of small-to-medium wind turbines will make several troubles for local utilities such as harmonics or power factor is generally desirable in a power system to decrease power losses and improve voltage regulation at the load. It is often desirable to adjust the PF of a system to near 1.0. When reactive elements supply or absorb reactive power near the load, the apparent