# Abstract

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### Design and Control of a Diode Clamped Multilevel Wind Energy System Using a Stand-Alone AC-DC-AC Converter

The major application of the stand-alone power system is in remote areas where utility lines are uneconomical to install due to terrain, the right-of way difficulties the environmental concerns. Villages that are not yet connected to utility lines are the largest potential market of the hybrid stand-alone systems using diesel generator with wind PV for meeting their energy needs. The stand-alone hybrid system is technically more challenging and expensive to design than the grid-connected system that simply augments the existing utility system. This paper presents a regulated AC/DC/AC supply to convert wind energy to stand alone system. Multilevel inverter technology has emerged recently as a very important alternative in the area of high-power medium-voltage energy control. The topology of the diode-clamped inverter is presented with the relevant control and modulation method developed for this converter, which is: multilevel ive harmonic elimination, where additional notches are introduced in the multi-level output voltage. These notches eliminate harmonics at the low order/frequency and hence the filter size is reduced without increasing the switching losses and cost of the system. The proposed modulation method is verified through simulation using a five-level Diode-clamped inverter prototype. The harmonic of the supply generator current affect the electromechanical torque which has an impact on the vibration of the wind turbine. A multiphase transformer is designed to eliminate lower order harmonics of the generator current. The system consists of a wind-driven permanent magnet synchronous generator whose output is stepped down via a multiphase transformer, whose secondary voltages are rectified through an uncontrolled AC/DC converters to provide different input DC voltage levels to the diode clamp quazi phase multilevel inverter where the pulse widths are adjusted to eliminate low order harmonics of the output voltage whose magnitude is kept constant with different loading condition by controlling the inverter switching and maintaining low total harmonic distortion THD.