Photo-Voltaic Based High-Frequency Transformer-Rectifier for High Voltage Applications

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Abstract

In this article, solar powered static power converters with ferrite core transformer for high voltage DC Applications have been discussed. The Inverter is designed using Insulated Gate Bipolar Transistor (IGBT) which is operated with the switching frequency of 20 kHz. The switching pulses in the dsPIC30F4011 microcontroller have been automatically generated using real time workshop in MATLAB/SIMULINK. High Voltage Bridge Rectifier circuit is developed by series connection of large number of 1N4007 diodes. E-Type ferrite core is used in the High Frequency transformer due to simple assembly and bobbin winding. The objective of this paper is design and develops the solar powered cost effective needle-plate type electrostatic precipitator, including a high voltage power supply made-up of a power electronic converters and ferrite core transformer. The modeling of PV module and power supply to the electrostatic precipitator was simulated using MATLAB/SIMULINK and its results were validated with experimental results of portable "needle-plate" type ESP.

Keywords: Photo-Voltaic(PV), Diode Bridge Rectifier(DBR),High Frequency(HF) Transformer, Electrostatic Precipitator(ESP).