IEEE GUJARAT SECTION

IEEE Gujarat Section &
Joint Chapter on IEEE IE/IAS/PEL Society organizes a
Webinar on
Multi-mode buck-boost inverters for PV applications
Date: 17/10/2022 , Time: 3:00 PM to 4:30 PM IST

Dr. Ashok Kumar

Biography:

Dr. Ashok Kumar received the B.Tech. degree in electrical engineering from the National Institute of Technology, Raipur, India, in 2010, M.Tech. degree in electrical drives and power electronics from the Indian Institute of Technology (IIT), Roorkee, India, in 2012, and Ph.D. degree in inverter topologies for photovoltaic (PV) applications from the Department of Electrical Engineering, IIT Kanpur, India. His research interests include power electronic converters and control for renewable energy sources.

Dr. Ashok was a visiting Research Fellow at Imperial College of London, UK. He has been working as an Assistant Professor at IIT Dhanbad since Jan-2022.

Abstract of the Talk

Power electronics play a critical and decisive role in utilizing eco-friendly energy sources for feeding power to the utility grid or load. Generally, for interfacing a low-voltage renewable energy source, like solar photovoltaic (PV) and small wind turbines, to an ac load or the utility grid, a line frequency transformer is used with a conventional voltage source inverter (VSI). Though it provides galvanic isolation, line frequency transformers are bulky, costly, and have higher losses due to the switching harmonic currents which flow through them. Hence, transformer-less inverters with “buck-boost” capability serve as a smaller, more efficient grid interface for renewable sources.

Based on the number of sub-circuits involved in the production of bipolar output, single-stage inverters can be classified into three categories: quad-modal, bi-modal, and single-mode. There are four individual circuits in quad-modal, two for each half of the AC voltage, working synchronously to produce bipolar output. Similarly, bimodal inverters use two distinct topologies, while single-mode configurations have a single circuit for generating bipolar output.

In this talk, the possibilities of achieving AC output by combining two different typical dc-dc buck-boost converters, which individually produce voltages of different polarity, will be conveyed. The derivation strategy for a bimodal inverter will be explained. Conventional second and fourth-order dc-dc converters will be examined for the creation of inverter topology. Of the several combinations, only a few feasible bimodal circuits are suitable for a buck-boost inverter system. Some of the essential issues related to micro-inverter topologies will be illustrated.