



Dr. Mohammad Atif Siddiqui, Associate Professor & Head of the Department of Electrical Engineering, Integral University, Lucknow, is a dedicated academician and researcher in Control & Automation Engineering within the broader domain of engineering and applied sciences. He earned his PhD from the National Institute of Technology (NIT) Silchar, India, which providing him with a strong foundation in control systems, automation, and interdisciplinary research. His interests include emerging technologies, intelligent control, and sustainable, application-oriented engineering solutions. Dr. Siddiqui has actively contributed to research through peer-reviewed journal publications and conference presentations. He has supervised many PhD scholars, postgraduate dissertations, and undergraduate-level projects. Additionally, he has been actively involved in academic program development, professional training, and collaborative research initiatives.



Dr. Mohd Khursheed Siddiqui is an Associate Professor in the Department of Electrical Engineering at Integral University, Lucknow, India, with over 15 years of experience in teaching, research, and academic administration. He holds a PhD in Electrical Engineering from Integral university, Lucknow in the field of Renewable Energy and earned his postgraduate and undergraduate degrees in Electrical Engineering, from Aligarh Muslim University, Aligarh, India, with a strong academic foundation in power systems and Drives. He previously served as Head of the Department of Electrical Engineering for three years Dr. Khursheed has supervised numerous PhD scholars, postgraduate dissertations, and undergraduate-level projects. He has published several research papers in peer reviewed reputed journals and IEEE-indexed conferences and has edited one academic book. His research interests include renewable energy integration, electric vehicle technology, DC microgrids, multilevel inverters, EV-to-grid systems, and AI-based power management.

Control, Simulation, and Optimization in Modern Power and Renewable Energy Systems

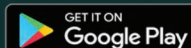
CONTROL, SIMULATION, AND OPTIMIZATION IN MODERN POWER AND RENEWABLE ENERGY SYSTEMS

Edited by
Dr. Mohammad Atif Siddiqui
Dr. Mohd Khursheed Siddiqui



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**Mohammad Atif Siddiqui
Department of Electrical
Engineering, Integral University,
Lucknow, UP, India**

**Mohd Khursheed Siddiqui
Department of Electrical
Engineering, Integral University,
Lucknow, UP, India**



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Performance Analysis of Transformer less Inverter Topologies for PV Applications

Yasmeen Fatima, Dr. Mohammad Asim, Dr. Atif Siddiqui

^{1,2,3}*Department of Electrical Engineering, Integral University,*

Lucknow, UP, India, 226026

Abstract: The topic “Performance Analysis of Transformer less Inverter Topologies for PV Application” revolves around the optimization and design of transformer less inverters for grid-connected photovoltaic (PV) systems. It delves into the objectives, advantages, classifications, and various topologies of PV systems. Additionally, it extensively discusses leakage currents, challenges associated with them, and methodologies to suppress these currents for enhanced safety and performance. It scrutinizes different inverter topologies such as Half-Bridge, Full-Bridge, H5, and H6 inverters, outlining their advantages, operational modes, and limitations. Furthermore, the report evaluates bipolar and unipolar modulation techniques, highlighting their respective efficiencies and challenges in minimizing leakage currents. The conclusion emphasizes the importance of balancing efficiency gains with mitigating leakage currents in transformer less inverter designs, underscoring ongoing research aiming to achieve this balance effectively. Overall, main focuses of the study are on enhancing the efficiency and safety of grid-connected PV systems while addressing challenges related to common-mode leakage currents.

1. Introduction

Renewable energy sources, including solar and wind energy, have gained significant prominence due to their inherent availability in the natural environment and their eco-friendly nature. They