



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

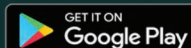
CONTROL, SIMULATION, AND OPTIMIZATION IN MODERN POWER AND RENEWABLE ENERGY SYSTEMS

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



BOOK RIVERS
WE CREATE READERS

BOOK AVAILABLE



9 789368 846130

₹ 375/-

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

Edited by

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

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



BOOK RIVERS
WE CREATE READERS

No part of this publication may be reproduced, transmitted or stored in a retrieval system, in any form or by any means, electronic, mechanical, photocopying recording or otherwise, without the prior permission of the author.

Published by: - Book Rivers

Website: - <https://www.bookrivers.com/>

Email: publish@bookrivers.com

First Print Edition - 2026

Copyright©: Authors

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

Authors: Mohammad Atif Siddiqui, Mohd Khursheed Siddiqui

All Rights Reserved

ISBN: 978-93-6884-613-0

MRP: 375/-INR

(Printed in India)

CONTENT

Chapter. No.	Title of the Chapter	Name of Authors	Pg. No.
1.	Load Frequency Control of Single Area Power System through PID Controller	Mohammad Atif Siddiqui Adab Ishtiyaq	1 - 21
2.	Proportional Integral Controller Based Electric Vehicle Charging System	Mohd Khursheed Siddiqui Gayanedar Bahadur Singh	22 - 36
3.	Performance Analysis of Transformer less Inverter Topologies for PV Applications	Yasmeen Fatima Mohammad Asim Atif Siddiqui	37 - 58
4.	Modeling and Analysis of Switch Reluctance Motor Drive for Hybrid Electric Vehicles Application	Prabhat Ranajan Sarkar Ujjawal Tripathi	59 - 74
5.	Modelling, Simulation and Dynamic Performance Analysis of Synchronous Generator	Mirza Mohd Shadab, Mohammed Asim	75 - 93
6.	Transformerless Inverter Topologies for Grid- Connected PV System	Mohammed Asim Mohd Amaan Khan	94 - 116

7.	Analysis and Implementation of Cascaded Multilevel Inverter Topologies for Solar PV Applications	Israr Amad Mohd Khursheed Salman Ahmad	117 - 132
8.	Fixed Head Multi-Hour Optimal Scheduling of Hydro-Thermal Power Plants Using Teaching- Learning-Based Optimization Algorithm	Israr Amad Kundan S	133 - 154
9.	Modulation and Control of Packed U Cell 7 Level Multilevel Inverter for Solar PV Applications	Prabhat Ranjan Sakar	155 - 175

Chapter – 6

Transformer less Inverter Topologies for Grid-Connected PV System

Dr. Mohammed Asim, Mohd Amaan Khan

*^{1,2}Department of Electrical Engineering, Integral University,
Lucknow, UP, India, 226026*

Abstract: Since last few decades, the renewable energy resources have been the area of focus. The renewable resources such as sun, wind, hydro, etc have a huge potential. Potentially, they can meet any present or future demand. But their exploitation is more difficult than their non-renewable counterparts. Since the fossil fuels are depleting there is a huge attention towards renewable sources. But to successfully exploit the resource to the benefit of the mankind, research continues to solve the problems existing in renewable energy based systems.

1.1 PHOTOVOLTAIC SYSTEM

The renewable energy resources are fast replacing the most conventional resources of energy owing to several demerits of the non-renewable sources of energy. The reserves of the latter are limited and are sure to get exhausted in future. In addition to this they cause pollution of the environment. But, the non-renewable resources are easy to exploit and usually have lower cost and infrastructure requirements. Therefore since decades, mankind has been making efforts to make the extraction of energy from renewable resources more fruitful and simpler.

With about 57 GW of installed capacity in India and growing, the solar energy offers the most promising prospects to meet the growing energy demands. This figure of installed capacity is far greater than that of any other renewable energy resource with wind