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

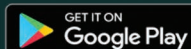
CONTROL, SIMULATION, AND OPTIMIZATION IN MODERN POWER AND RENEWABLE ENERGY SYSTEMS

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



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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 – 1

Load Frequency Control of Single Area Power System through PID Controller

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1. INTRODUCTION

The main aim of power generating system is to deliver adequate, high quality, reliable power to the load. The increased size and complexity of modern interconnected power systems and the load dynamics require increased intelligence and flexibility in control to ensure the capability of maintaining a generation-load balance. Load Frequency Control (LFC) and Automatic Voltage Regulator (AVR) are the two fundamental control loops used to maintain constant frequency and voltage in order to ensure the reliability and quality of electric power supply. Any of the conventional controllers like Proportional (P), Proportional-Integral (PI) or Proportional- Integral-Derivative (PID) controller are normally used in LFC and AVR control loop to reduce the frequency and voltage error. However, tuning the gain parameters of these controllers is always a challenging task. The conventional ways of tuning provides fixed gain parameters. These fixed gain controllers fail to provide best control performances under wide range of operating conditions. In order to provide an acceptable high level of power quality, the power system should cope with the load dynamics, physical constraints and with the system disturbances. Therefore, it is desirable to track the operating conditions consistently and to compute the updated gain parameters in the controllers.