Solar PV and wind energy is an integral part of different renewable energy resources, in general, and, in particular, it is the main and continuous input variable from the practically inexhaustible sun. Solar energy is expected to play a very significant role in the future especially in developing countries, but it also has potential in developed countries. Over the past few years, wind energy has shown the fastest rate of growth of any form of electricity generation with its development stimulated by concerns of national policy makers over climate change, energy diversity and security of supply. The material presented in this book has been chosen to provide a comprehensive account of solar energy modeling methods based on MATLAB/SIMULINK.

The book is intended for later year undergraduate, post-graduate and research students interested in understanding the modeling and control of large wind turbine generators based on MATLAB/SIMULINK. It starts with a review of the principles of operation, modeling and control of the common solar energy and wind generation systems and then moves on to discuss grid compatibility, power quality issues and hybrid models of solar PV and Wind Energy Conversion Systems. MATLAB/SIMULINK models of fuel cell technology and their converters are discussed in detail. The impact of soft computing techniques such as neural networks, fuzzy logic, and genetic algorithms in the area of solar and wind energy is explained with practical implementation using MATLAB/SIMULINK models.

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