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Hybrid solar/wind micro-grid systems

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The primary objective of this paper is to present the design and optimization of a power converter for a hybrid wind-solar energy conversion system with an implementation of Maximum Power Point Tracking (MPPT). The power converter can transfer the power from a wind generator and photovoltaic panel and improve the safety and stability of the hybrid system. This system design consists of Permanent Magnet Synchronous Generator (PMSG), a full wave AC-DC bridge rectifier, a DC-DC boost converter, a bidirectional DC-DC converter, and a full bridge DC-AC inverter. The wind generator and the photovoltaic panel are used as the primary power sources of the system, and a battery is used for energy storage and to compensate for the irregularity of the power sources. This paper also presents the structure of the beginning rectifier stage for the hybrid wind-solar energy power conversion system. This structure thereby provides two energy sources simultaneously yet independently, according to their respective availability. The rectifier stage fosters the maximum from wind and solar energy when an adaptive MPPT algorithm is used in the system. The analysis for the system will be discussed in this paper and will give an introduction to the design of the hybrid wind/solar converter circuit.

Biography

Akram Abu-aisheh is an Associate Professor of Electrical and Computer Engineering at the University of Hartford. He is a Senior IEEE Member, and he has 10 years of industry experience in the area of fiber optic telecommunication systems and power electronics. His research interests include optical communications and power electronics. He has MS and BS degrees in Electrical Engineering from the University of Florida and a PhD from the Florida Institute of Technology.

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