

Partial Sine Wave Tracking Dual Mode Control Topology for Single-Phase PV Power Conditioner

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Abstract:

In recent years, the latest and feasible development on high efficiency, high power density and cost effective solar photovoltaic generation system for residential and DC micro power grid applications have attracted special interest from a global environmental point of view. The further practical and cost effective requirements as much higher efficiency, smaller on physical size and lighter in weight for small scale stand-alone or utility interactive sine wave power conditioner, and some new conceptual power conditioners based on power electronic circuit controller is developed.

This presentation provides a new conceptual circuit topology of a high efficiency single-phase sine wave PV power conditioner with a compact intermediate film capacitor DC link stage. It consists of time-sharing partial sine wave absolute pulse width modulated (PWM) boost converter with auxiliary bypass diode in the first power processing stage and time-sharing partial sine wave pulse width modulated polarity changing full-bridge inverter in the second power processing stage operated by dual mode pulse pattern control scheme. Its unique operating principle of two power processing stages with time-sharing dual mode sine wave modulation scheme is described with a design example. This presentation also proposes a sine wave tracking voltage controlled soft switching PWM boost converter with a passive auxiliary edge-resonant snubber.

The operating principle of the novel single-phase sine wave power conditioner for the solar photovoltaic generation system is presented and discussed through the experimental results together with its control processing.