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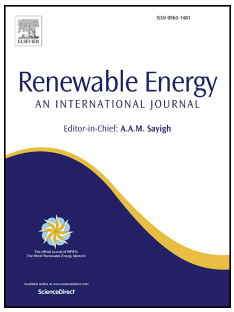

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Duck-Hwan Hwang, Jung-Yong Lee, Younghoon Cho

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Single-Phase Single-Stage Dual-Buck Photovoltaic Inverter with Active Power Decoupling Strategy

Duck-Hwan Hwang, Jung-Yong Lee, Younghoon Cho*

Department of Electrical Engineering, Konkuk University
120 Neungdong-ro, Gwangjin-gu, Seoul, Korea

Corresponding author: Younghoon Cho Email: yhcho98@konkuk.ac.kr

Abstract– This paper proposes a single-phase single-stage dual-buck photovoltaic (PV) inverter with an active power decoupling (APD) strategy. Using this strategy, the dc-link voltage pulsating caused by a low-frequency power fluctuation in single-phase systems can be reduced without using a bulky dc-link storage. A simple active damping control is adopted to suppress the resonance of the APD circuit, so that the design of the feedback control becomes simple and reliable. Furthermore, the APD circuit directly regulates the dc-link voltage, which is identical to the PV voltage in single-stage PV inverters. Hence, the dc-link voltage control in the given power stage, where the unidirectional dual-buck topology is employed, is supplemented. The APD strategy can be universally applied in single-stage PV inverters regardless of the topology connected to the utility grid. To verify the proposed scheme, both simulations and experiments on a 2.1 kW single-phase single-stage dual-buck PV inverter are conducted. The results confirm that the proposed method not only reduces the dc-link voltage pulsating but also improves the MPPT accuracy. Compared to the power stage using electrolytic capacitors, the proposed scheme decreases the physical size and implementation cost of the dc-link storage.

Keywords: **photovoltaic systems, inverter, converter, active power decoupling, maximum power point tracking, dual-buck inverter**