

A Novel Capacitor Voltage-Reduced Bidirectional PWM DC-DC Buck-Boost Converter for Renewable Energy Battery Charge System

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October 20, 2022

Abstract

A novel capacitor voltage-reduced bidirectional (CVRB) PWM DC-DC buck-boost converter is presented in this study. Compared to the conventional bidirectional buck-boost converter, the proposed converter has a lower voltage rating filter capacitor. Accordingly, the given converter has a lower cost and 3.3% higher power density than the conventional buck-boost converter. Additionally, the proposed converter is more efficient due to the direct power transfer feature. Besides, the semiconductor switches have no extra voltage/current stress. The theoretical analysis of the converter is made, and its mathematical analysis is presented. The novel converter is experimentally operated in both the buck and boost modes. The experimental waveforms are shown for both operations. The proposed converter is operated in 100 W output power and 20 kHz switching frequency conditions.

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