A DC-DC Converter with Wide Input Voltage Range for Fuel Cell and Supercapacitor Application

This paper proposes a novel phase-shift plus duty cycle controlled hybrid bi-directional DC-DC converter based on fuel cells and supercapacitors. The described converter employs two high frequency transformers to couple the half-bridge and full-bridge circuits together in the primary side and voltage doubler circuit in secondary side. Boost type converter can limit the output ripple current of the fuel cells; hybrid full-bridge structure can change operating modes according to the different input voltage; phase-shift with duty cycle control scheme is utilized to control the bidirectional power flow flexibly. All the switches can turn on under zero-voltage-switching condition (ZVS). The operating principles of the converter are described in details, and the experimental results based on the prototype controlled by DSP are presented to verify the validity of the analysis and design.

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