A Two-stage DC-DC Converter for the Fuel Cell-Supercapacitor Hybrid System

A wide input range multi-stage converter is proposed with the fuel cells and supercapacitors as a hybrid system. The front-end two-phase boost converter is used to optimize the output power and to reduce the current ripple of fuel cells. The supercapacitor power module is connected by push-pull-forward half bridge (PPFHB) converter with coupled inductors in the second stage to handle the slow transient response of the fuel cells and realize the bidirectional power flow control. Moreover, this cascaded structure simplifies the power management. The control strategy for the whole system is analyzed and designed. A 1kW prototype controlled by TMS320F2808 DSP is built in the lab. Simulation and experimental results confirm the feasibility of the proposed two stage dc-dc converter system.

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