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High-Frequency Full-Bridge Isolated DC-DC Converter for Fuel Cell Power Generation Systems

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Abstract : DC-DC converters are necessary to interface low-voltage fuel cell power generation systems to a higher voltage DC bus system. A system and method for generating a regulated output power from fuel cell power generation systems is proposed in this paper, this includes a soft-switching isolated DC-DC converter to reduce the idling and circulating currents. The system incorporates a high-frequency center tap transformer link DC-DC converter using secondary-side soft switching control. Snubber capacitors including the parasitic capacitance of the switching devices and the transformer leakage inductance are utilized to achieve zero-voltage switching (ZVS) in the primary side of the high-frequency transformer. Therefore, no extra resonant components are required for ZVS. The inherent soft-switching capability allows high power density, efficient power conversion, and compact packaging. A prototype rated at 6.5 kW is proposed and simulated. Simulation results confirmed a wide range of soft-switching operation and consequently high conversion efficiency will be achieved.

Keywords : secondary-side, phase-shift, high-frequency transformer, zero voltage, zero current, soft switching operation, switching losses
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