Analysis and Comparison of dc/dc Topologies in Partial Power Processing Configuration for Energy Storage Systems

This paper presents an analysis and comparison of dc/dc switched-mode power supplies (SMPS) for energy storage systems in partial power processing (PPP) configuration. The advantage of this configuration is that the SMPS only processes the partial power resulting from the voltage difference between the source and the energy storage element, thus allowing for a reduction of the converter power rating. Selection of an appropriate topology for a given system configuration is the key factor in achieving high efficiency power conversion. An analysis and comparison of dc/dc topologies based on component stress factor (CSF) is performed to determine the optimal solution for the evaluated application. Based on the results of the CSF analysis, a dc/dc converter is designed, built and tested. Experimental results prove the feasibility of the PPP configuration with a reduction of the 80\% of the power rating compared to the traditional interconnection, which implies a reduction in cost, weight and an increase in efficiency.

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