A Study of Modeling and Simulation for Soft-switched Bi-directional DC-DC Converters

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Abstract

In this paper, an extended averaged model is presented for a soft-switched bi-directional dc-dc converter for high power applications. Although Pspice-like software can be used to simulate the detailed performance of power stage, it is very inconvenient and time-consuming to study the large-signal long-time dynamic operation without using the average modeling. In addition, an average model is very helpful for control system analysis and converter design. However, it is difficult to build an average model using the conventioal state-space averaging technique for the isolated dc-dc converter proposed in this paper. This is because not only dc variables but also ac variables exist in this kind of converters. Therefore a new switching frequency dependent averaged model is developed and simulated with Matlab/Simulink. The proposed technique can be applied to any dc-dc converter with a high frequency isolation transformer. The simulation results using the proposed average model are compared to those of detailed simulation to verify the validity of this technique.