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A NEW CLASS OF HIGH EFFICIENCY MULTIPHASE DC-DC CONVERTERS

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Cuvinte cheie:

multiphase converter, interleaved converters, hybrid converters, L-switching cell, coupled inductors, high efficiency.

Rezumat:

The present thesis wishes to offer a new class of high efficiency multiphase DC-DC converters. A brief presentation of the L- and C-switching structures proposed in the literature by Boris Axelrod, Yefim Berkovich and Adrian Ioinovici which are inserted in classical and bidirectional converters resulting 17 new hybrid structures, has been presented in the thesis. After a comparative study of the hybrid converters, one topology has been chosen and a method for increasing the efficiency, reducing the size through reducing the numbers of inductors without affecting the circuit operation and the dc voltage transfer function have been proposed. Analytical study, operating modes, simulation and experimental results have been included in the thesis. A synthesizing method for getting new multiphase hybrid converters is proposed. Also, 11 new topologies of multiphase hybrid DC-DC converter were proposed by the author. The validation of one of the multiphase hybrid converter proposed by the author is realised. Analytical study, system description, operating modes, simulation and experimental results have been included in the thesis for two-phase converter, and the deduction of the relationship was extended to n-phase converter. Simulation was realised in CASPOC Simulation Program and SABER Simulator. The proposed converter can be used as an interface between the renewable energy system (PV or fuel cell system) and the dc load/inverter/battery.

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