

CSI and CSI7 current source inverters for modular transformerless PV inverters

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Abstract— Current source inverter (CSI) is a class of power electronic converters that, thanks to the inherent boost capability and ease of control, is investigated for grid-tied photovoltaic power conversion applications. Traditional CSI and CSI7 topologies are here analyzed and compared with two kind of space vector modulation strategies mainly in terms of ground leakage current both in simulations and experiments. Furthermore, THD of the injected grid current and the computation of conduction and switching semiconductor power losses are also carried out in numerical simulations. The topology comparison is carried out with the use of a different number of PV modules, to analyze the robustness of the topologies to different size of the PV strings. Simulation and experimental results show that the CSI7 topology, with respect to conventional CSI, allows to strongly reduce ground leakage current, phase current THD and semiconductor power losses, at the price of an additional power device.

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