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Novel Hybrid Neutral Point Clamped Inverter for Single-Phase Grid-Tied Transformerless Inverter

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Abstract

The grid-tied inverter is one of the fast-evolving technology in the present era that aims to support the centralized power generation system with a distributed power generation system. The use of renewable energy resources makes it popular due to its easy availability. The issues associated with grid-tied inverter are its size and cost. To reduce the size and cost of the inverter it is desirable to replace the conventional inverter with a transformerless inverter. The absence of an isolation transformer leads to leakage current flow between the grid and the photovoltaic cell. This paper presents a discussion on the neutral point clamped inverter used in the grid-tied inverter system that aims to reduce the leakage current with the help of a novel hybrid neutral point clamping that provides an additional freewheeling path. It is observed that the proposed topology ensures good common mode differential mode characteristics by keeping the leakage current down to 7.2 mA rms and clamping the commonmode voltage effectively to zero volts. A current THD of 0.19 % and a European efficiency of 96.52 % is achieved.

Key words:

Grid-tied, single-phase, neutral point clamp, leakage current.

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