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A Hybrid Resonant ZVZCS Three-Level Converter Suitable for Photovoltaic Power DC Distribution System

In this project, a novel hybrid resonant Zero-Current-Switching (ZCS) three-level DC-DC converter based on a dual transformer with two output filter capacitors is proposed, which is suitable for application in distributed photovoltaic power generation at medium voltage integrated with a DC distribution network. The proposed converter adds an auxiliary circuit to the traditional Neutral Point Clamped (NPC) three-level (TL) circuit, which contains the basic NPC three-level circuit. Pulse width modulation (PWM) is adopted in the auxiliary circuit portion to realize the power and voltage regulation of the whole converter, and enable the main switches to operate with a fixed duty cycle. This has the advantages of simplified control. By reasonable design of the turn's ratio of the main transformer, the main three-level circuit can deliver most of the power and achieve ZCS within the under full load range that significantly reduced the switching losses. Therefore, the turn's ratio of the auxiliary transformer can be optimized to reduce the loss of the converter further and improve the conversion efficiency as discussed in detail, while the parameters' design principles are put forward

Domain: Power Systems / Distribution Systems

Technology: Electrical