

Master Thesis

Development and Setup of a three-phase three level neutral point clamped inverter (3L-I-Type) and evaluation of different modulation methods on the conducted noise



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Background:

The first application for multilevel converters was in high-power drives with high voltage. Because of technology trends such as lower cost for power semiconductors and better performance for real-time controllers, these topologies also penetrate low-voltage areas. Neutral point-clamped inverters can provide low voltage stress on the components and generate low-power harmonics. Nevertheless, because of their higher losses, their usage in lower-power industrial applications is still limited. To analyse the impact of the neutral point clamped inverter in low-power industrial applications, three phases, three-level converter has to be designed and tested with respect to the conducted noise generated by different modulation methods

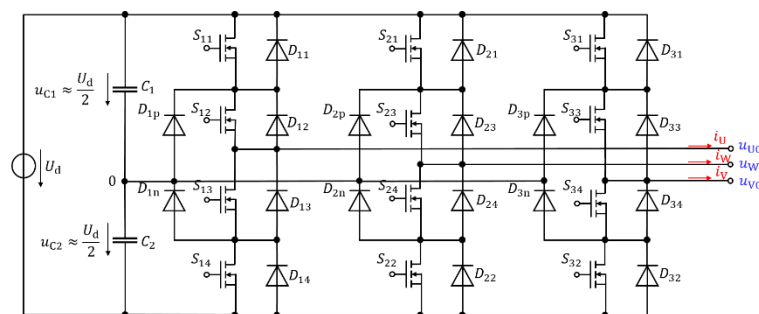


Fig. 1: Three-level neutral point clamped inverter

Goal (Master Thesis):

This thesis aims to develop, set up, and test a three-phase, three-level neutral point clamped inverter (3L-I-Type) and implement different modulation methods. The developed prototype is then used to measure the conducted noise and the impact of the different modulation methods on the conducted noise.

Tasks (Master Thesis):

1. Research of relevant topics, amongst others: multilevel topologies, modulation methods, Gate Driver, control of the inverter, conducted noise...
2. PLECS Simulation of the topology with different modulation method
3. Component Selection and Schematic design
4. PCB design and implementation of the modulation
5. Assembly and verification of proper function
6. Measurement of the conducted noise and simulations
7. Documentation

Working Language: German, English