Simulation and Control of a Modular Multilevel Converter

TECHNISCHE UNIVERSITÄT DARMSTADT

Master's thesis at the department for power electronics and control of drives
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High voltage direct current transmission lines are slowly becoming more common, not only for oversea grid connections, but also to reinforce transmission grids, where there is a greater distance between production and consumption of electric energy.

In order to achieve conversion between AC and DC with a voltage source converter a topology called Modular Multilevel Converter (MMC) is used.

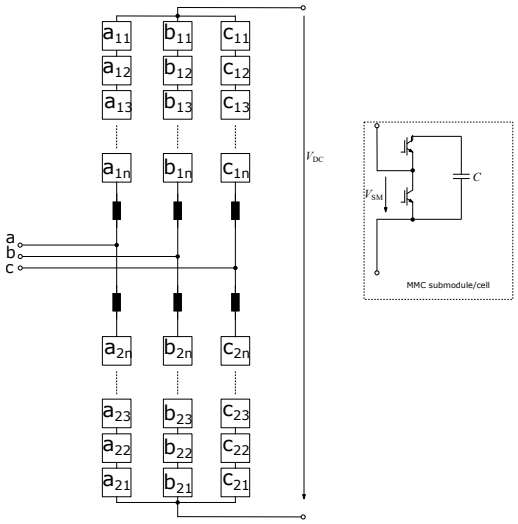


Figure 1: Modular Multilevel Converter and half-bridge submodule topology

During this thesis a simulation of an MMC topology including control should be implemented. Aside from the transfer of electrical energy between DC and AC-systems secondary control goals for energy balancing of the converter cells and clusters needs to be considered (For the energy balance of the cells within a cluster and the balance between the clusters). The control should be tested to still work for an AC connection with a slight voltage unbalance. A systematic control parametrisation is required.

For a master thesis a further aspect of the MCC should be chosen and investigated further. (e.g.: DC transmission, grid interaction and grid forming control, reliability, 4-leg topology, etc.)

The following skills should be promoted during this work:

- Control design
- Simulation of power electronics using PLECS
- Knowledge about modular multilevel converters
- Scientific writing

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