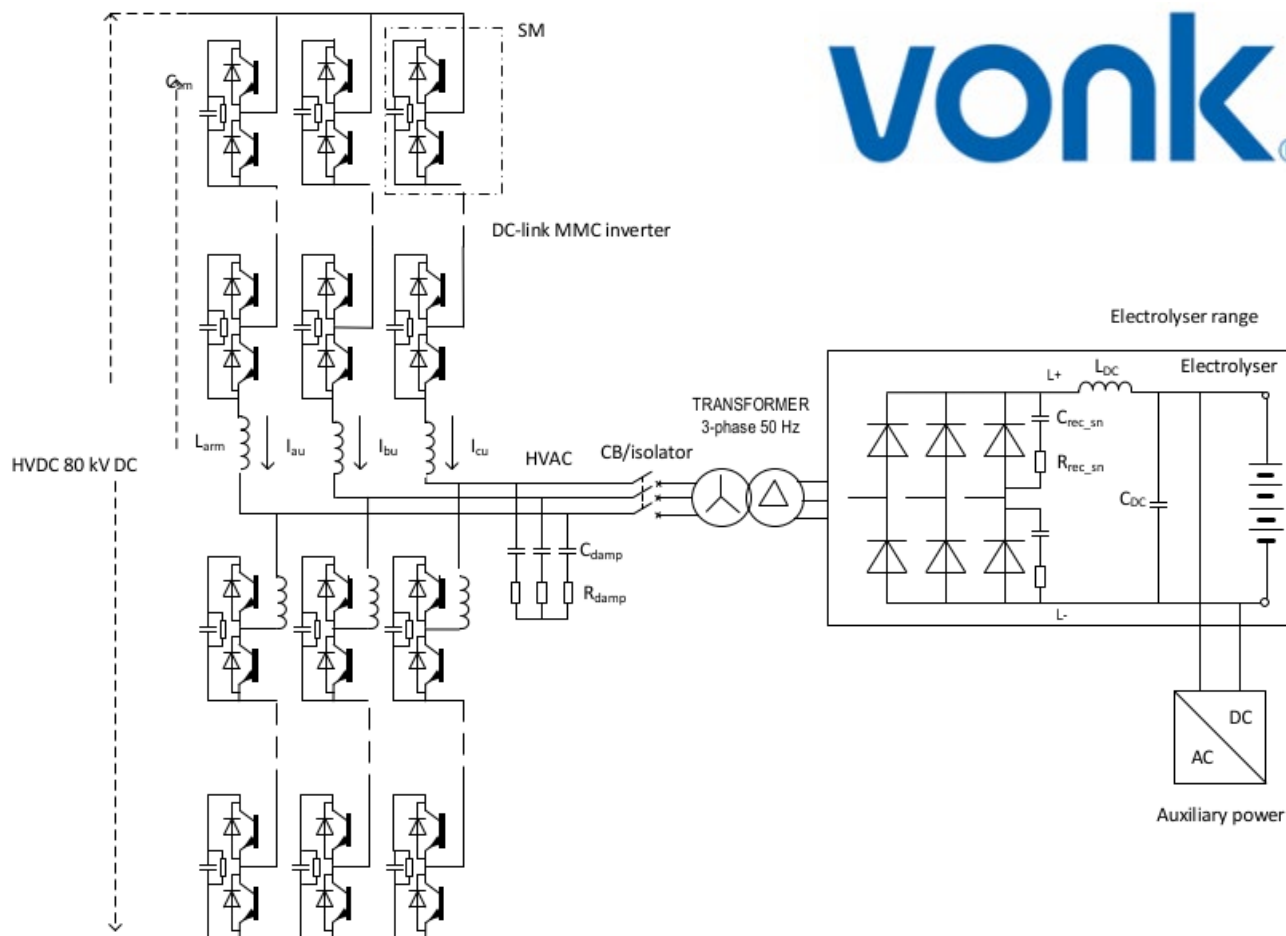


Design and Test an Optimal Control Strategy for a MVDC MMC

Master internship/thesis project



Summary:

To study and implement the control system for a Multilevel Modular Converter (MMC) for medium voltage DC grid integration of a high current electrolyser power supply.

Problem definition:

Vonk is leading manufacturer and system integrator of the power supplies which converts the available energy from any renewable energy source to feed the electrolyser with the desired power quality. Vonk along with other industrial partners is investing in upscaling of the green hydrogen generation. One of the crucial parts in the system is the power supply with which these electrolysers are powered. A MMC based power supply topology is proposed as an interface between a MVDC or HVDC grid and LVDC electrolyser. The student shall design and integrate the control loops for the MMC on the available small, scaled prototype or test bench.

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Method:

- Literature review will be done to find the best control strategy.
- Simulations in MATLAB Simulink, concerning:
 - Voltage and current loops.
 - Submodule capacitor balancing loop.
 - Circulating current reduction loop.
 - Active filtering control loop.
- Measurement and Protection loops.
- Implementation of control loops in a scaled prototype.

Research objectives:

- Determination optimal switching techniques for MMC and required control loops.
- Derivation of control loop parameter.
- Realisation of Control loops for the scaled prototype.
- Effect of upscaling on control system parameters from prototype to a real system.

Courses and supervision:

No specific courses other than the power electronics compulsory courses are needed as a background.

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