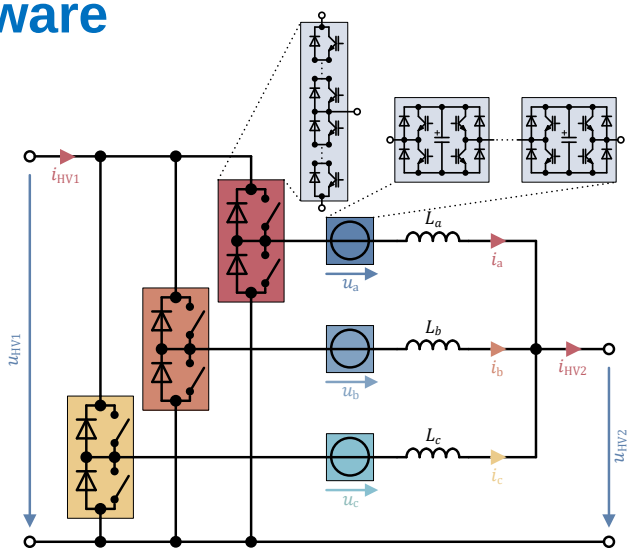
Graz University of Technology
Electric Drives and Machines Institute

Master's Thesis

GriDConv – Improvement of the Control and Communication Hardware

Motivation



Line commutated HVDC transmission lines are well established for long distance power distribution, despite their demand for minimum AC voltage and limitations to point to point connections. HVDC grids promise to overcome these limitations by utilizing self-commutated topologies, thus introducing black start capability and enabling interconnection of several HVDC power lines. Aside of coupling DC to AC grids, interconnection of HVDC systems with different rated voltages demands for HVDC-DC converters capable of bidirectional power flow control as well as selective fault separation, providing high efficiency at reasonable cost and small footprint.
In 2020 a small-scale prototype (800 V/500 V, 50 kW) of such an HVDC-DC converter was built in a collaboration of five different institutes at TU Graz. This prototype is based on a modular branch-structure of series connected IGBTs, inductors and IGBT full-bridge-modules with DC-links. In order to further improve the developed hardware and make it more robust concerning EMI, the control and communication strategy of the modules should be revisited.

Research Questions

- How can the communication scheme of such modular converter topologies be improved?
- What challenges and benefits does the "outsourcing" of control tasks from the central control system to the modules offer?

Tasks

- Improvement of the currently used communication scheme
- Verification of the developed optimizations in simulations
- Partial redesign of the currently used hardware

Contact

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