Christian-Albrechts-Universität zu Kiel

Technische Fakultät

Non-Zero Energy Balance Controller Design for Modular Multilevel Converters to Integrate Partial Energy Storage Systems into MV Grid.

Master Thesis Topic

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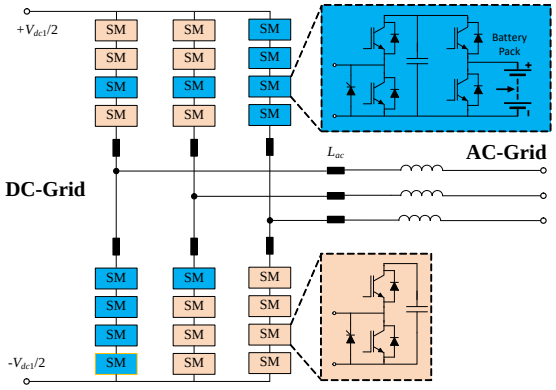
Abstract–Retired batteries from EV applications with a state of health (SOH) bellow 80% can be effectively utilized in battery energy storage systems (BESS) for grid application before recycling them. Retired batteries are gradually increase in the market and they must be integrated into grid over time. In the future work, a controller will be designed to operate MMC with partially equipped submodules with battery packs where arm/cell energy balance is not zero anymore.



Background–**MMCs are well-known for their low loss operation, modular structure and direct integration of BESS into MV grid. Current BESS based MMCs are mainly designed to operate with active battery packs on all of their submodules. The control strategy may provide an infrastructure to create BESS based MMC, gradually. However, unsymmetrical structure and non-zero energy balance of the converter impose a new challenge to the design of the MMC controller.**

Objectives:

- Extract a frequency domain for the MMC with partially integrated batteries;
- Design and propose a proper controller for the MMC cells
- Developing new cell/arm/converter energy balancing algorithms.

Type of the Work:

- Simulations+Experimental

Language of the Thesis:

- English

Connected Project:

Chair of Power Electronics