Doktorvorträge am ISEA

Freitag, 03. Mai 2019
Kurpark Terrassen, Dammstraße 40, 52066 Aachen

09.15 Uhr Shenghui Cui, M.Sc.
„Modular Multilevel DC-DC Converters Interconnecting High-Voltage and Medium-Voltage DC Grids“

10.30 Uhr Jingxin Hu, M.Sc.
„Modulation and Dynamic Control of Intelligent Dual-Active-Bridge Converter Based Substations for Flexible DC Grids“

Kurzfassungen

Shenghui Cui
Modular Multilevel DC-DC Converters Interconnecting High-Voltage and Medium-Voltage DC Grids
The dc grid technology is a promising solution for integration of renewable energy generations and energy storage systems. The high-power dc-dc converters are key enabling components for future dc grids.

In this dissertation, a new circuit topology of modular multilevel dc-dc converters and its dedicated operation principle are proposed for interconnection of high-voltage dc transmission grids and medium-voltage dc distribution grids. Compared to the existing topologies dedicated to this application, the proposed converter presents significantly reduced active and passive components and lower device losses over a wide power range. A comprehensive discussion on topology, control, and fault-tolerant operation of the proposed converter is presented.

Jingxin Hu
Modulation and Dynamic Control of Intelligent Dual-Active-Bridge Converter Based Substations for Flexible DC Grids
With the increasing integration of renewable energies, energy storage systems and the emerging fast charging stations for electric vehicles, dc distributions grids present numerous advantages e.g. higher efficiency, higher power capability and higher flexibility compared to existing ac grids. The key enabling component of flexible dc grids is the intelligent dc substation based on high-power dc-dc converters, which needs to achieve high efficiency over a wide voltage and power range, control the power flow and grid voltage dynamically, and ride through dc short-circuit faults.

In this dissertation, improved modulation and dynamic control of a high-power three-phase dual-active bridge (DAB3) dc-dc converter are proposed to enhance the operating performance and functionalities of intelligent dc substations in dc-grid applications.