



**2014 IEEE PES Germany Chapter
Werner von Siemens
Best Master Thesis Award**

M.Sc. Constanze Troitzsch

for her Master Thesis

***Grid faults in meshed HVDC Grids –
A method for analysis, detection and clearing***

Constanze Troitzsch studied electrical engineering at Technische Universität Ilmenau with special interest in power systems. She prepared her master thesis at the Power System Department at Institute of Electric Power and Control Technologies. After her study she became young professional in the power industry. Currently she is specialist for operational planning at Swissgrid, the national transmission system operator in Switzerland.

Her Master thesis touches the very important subject of fault analysis, detection and clearing in meshed High Voltage Direct Current (HVDC) grids. In particular in Europe the mid term grid evolution could lead to a new network layer based on HVDC technology. Meshed HVDC grids have not been realized so far. Consequently, the development of methods for design and operation of these grids are ground breaking. The handling of grid faults is a highly sophisticated area. Because of lack of natural zero crossings and rapid rise of fault currents the use of existing AC protection techniques is not possible. This requires the design of a novel HVDC protection concept that meets the requirements established in three-phase AC systems regarding speed, reliability, accuracy, selectivity and efficiency. The objective of the master thesis of Constanze Troitzsch is the identification of fault current characteristics in meshed HVDC grids for the design and analysis of fault detection and fault clearance procedures. The focus is on DC line faults. Among other things, it is shown that the fault currents in HVDC-systems have a traveling-wave characteristic. Furthermore, an error detection concept without telecommunication is presented, which is mainly distinguished by its speed and high selectivity. The validity of the approaches has been demonstrated by means of several numerical case studies. Finally, the impact of DC fault clearing on the underlying interconnected AC power grid is analyzed.

The best master thesis award will be granted to the best student of one year fulfilling the following criteria: University master degree with distinction in the scientific area of power systems or high voltage engineering. Furthermore the candidate needed to demonstrate extracurricular engagement as well as work resp. trainee experience abroad. Finally, social skills will be valued as well. The Werner von Siemens Best Master Thesis award is the highest award of the IEEE PES Germany Chapter and is contributed by Siemens AG, Division "Energy Management".