Review of the Lecture
"MMC multi-terminal HVDC"
by Prof. Boon Teck Ooi on the 3rd of July, 2014

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This second lecture followed the first about the modelling and control of Modular Multilevel Converters (MMC) for the creation of a multi-terminal High Voltage Direct Current (HVDC) grid.

The determination of equivalent circuits was accomplished through the derivation of algebraic formulas and the source of "circulating currents" was identifies by using an "isotope tracer". Based on the identification of the source of these components, feed-forward and feedback methods were proposed to eliminate these components. The elimination of "circulating currents" allows a more efficient operation of the MMC but there are still some residual quantitates during normal operation.

The control of MMCs is dependent on the physical quantities in the AC and DC sides. In the case of AC faults, the control system might not perform adequately, and a new type of control, "deadbeat" makes the control more robust.

The analysis of the equivalent circuit of a MMC leads to the identification of capacitive reactance voltages on the AC side that can be used for power factor correction. Furthermore, the understanding of the operation of the MMC can be extended by the construction and interpretation of voltage and current phasor diagrams.

MMCs present several characteristics that allow their connection in parallel on the DC side for form multi-terminal MMC-based HVDC systems. Some results of the operation in this configuration were presented and discussed.

In addition, MMCs internal structure can be rearranged to provide a more effective operation with a reduced number of components. Simulation results that verifies the validity of the new internal structure were presented.

To conclude, and taking into account the particularities of the MMC, some studies and considerations were presented about their connection in series to use in Ultra HVDC (UHVDC transmission systems. Results are encouraging and more studies are currently being performed.