



Master project, 2017-2018

— *DC / DC converters for High Voltage Direct Current (HVDC) grid* —

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Context

With the possible integration of marine renewable energy like offshore wind turbine or hydro-turbine, the concept of High Voltage Direct Current (HVDC) grids begin to emerge. The L2EP works on this subject since 6 years in close cooperation with RTE. 2 thesis has been defended, 2 thesis will be defended before the end of the year, 4 PhD students and 2 post-doctorate are in progress on this topic. The interest of this work has allowed the emergence of this theme as transversal theme of L2EP. In addition, a demonstrator has been developed on this subject and presented as part of a European project name Twenties (<http://www.twenties-project.eu/node/148>).

The interconnection of multiple HVDC grids cannot be directly considered. In fact, it is not certain that the voltage levels of these grids are the same and therefore it will be necessary to introduce static converters for providing an interface of these different grids. In case of a short-circuit on a part of a DC grid, the DC/DC converter may act as a firewall to avoid the propagation of a fault which occurs on one DC grid to the DC grid located on the other side of the DC/DC converter.

This Master thesis proposes to study a DC / DC conversion structures adapted to the HVDC constraints. This work will be in connection with a PhD student who work on the M2DC converter.

Objective

The objective of the study is to perform a literature review of DC/DC converter structure adapted for HVDC, to understand why the M2DC is a good solution (topology, functionality, advantages and disadvantage). This structure and its control will be modeled and will be simulated with Matlab/Simulink.

Work steps

1. Bibliography on the subject
2. Modeling an interesting static converter with its control
3. Implement it in simulation
4. Propose an overvoltage modulation of this converter
5. Report writing

References

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