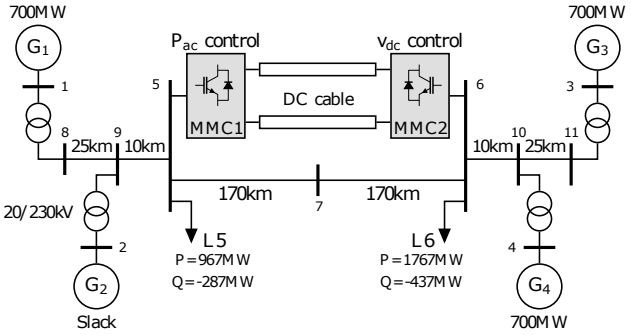
AC/DC small-signal stability analysis tool

Evaluating the impact of embedded DC grids

CONTEXT

HVDC systems based on VSC have caught special attention of the industry, not only by dint of their flexibility and controllability, but also by the benefits they provide to the AC grid in terms of power oscillations, specially when their nominal power is not neglibile from the AC point of view. Evaluating the impact of an HVDC link embedded into an AC grid can be done by time domain simulation, however since accurate models including different time scales can be very time consuming, sensitivity parametric studies will take too much time. Besides, additional mathematical tools are necessary to quantify those interactions based on measured signals.



EXEMPLE OF MULTI-MACHINE POWER SYSTEM WITH EMBEDDED MMC-HVDC LINK

SOFTWARE TOOL DESCRIPTION

As a solution to this problem, SuperGrid Institute developed an analysis tool allowing to evaluate the interactions between the AC and DC grids in terms of oscillating modes. The main feature of the proposed tool is the incorporation of the MMC technology including the virtual capacitor innovative control.

APPLICATION DOMAIN

AC/DC Multi-machine Power systems
Power systems control tunning
Point to point HVDC connection

ADVANTAGES

Fast parametric studies

Generalizablility

Help for AC and DC control tunning

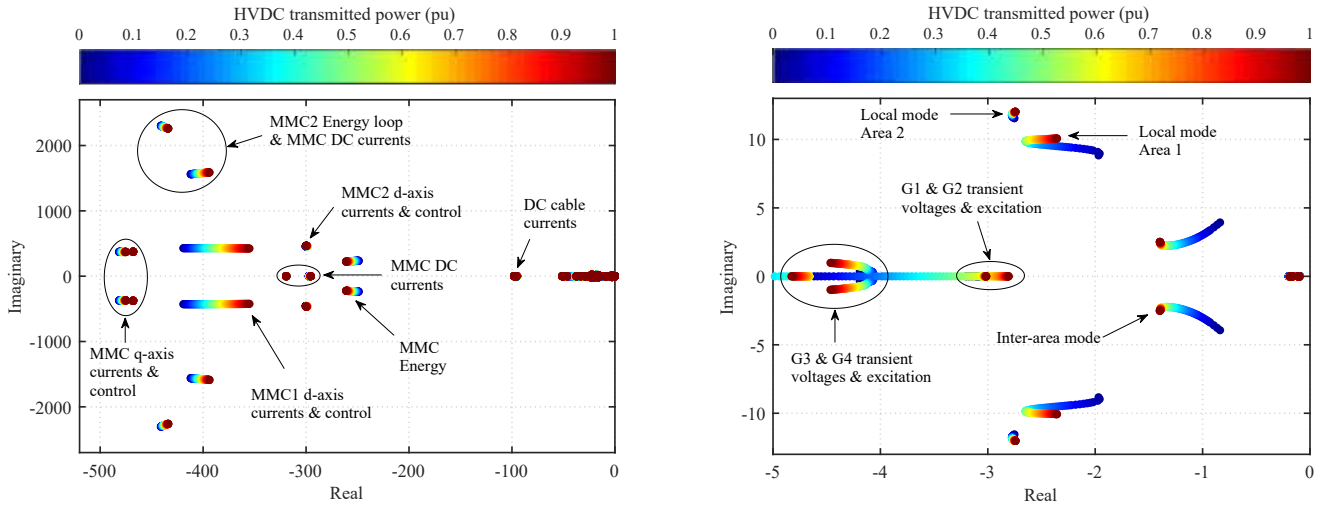
TRL SCALE

1 2 3 4 5 6 7 8 9

Tool validated with time domain simulation

DELIVERABLES

Implementation in Matlab environment
Technical reports
Training, technical support



IMPACT OF THE OPERATING POINT OF THE HVDC LINK ON ELECTROMECHANICAL OSCILLATIONS