

SUMMARY OF POWER FLOW AND STABILITY STUDIES

This brief overview features a variety of load flow and stability analysis for FACTS controllers, such as the static synchronous compensator (STATCOM) and the unified power flow controller (UPFC), static var compensators (SVC), as well as for conventional solutions. In addition, MEPPI has performed studies to verify the design and performance for FACTS controllers, including the comparison of controller performance to required criteria.

The studies department also performed studies comparing the feasibility of different FACTS and hybrid solutions. Examples of hybrid solutions that have been analyzed include the comparison of the UPFC stand-alone, to a combined phase angle regulator (PAR) and STATCOM, and to a combined PAR and UPFC. Primarily, transmission level FACTS solutions (and conventional solutions) were the focus of the load flow and stability analyses.

Studies have also been carried out for smaller devices in the tens of MVA range at lower voltage levels. For example, a study was performed to verify the control, operation, and rating of a voltage control device (VCD) at the 66 kV level. The VCD was comprised of a +2/-2 MVA D-STATCOM (Distribution-STATCOM), two 5 MVA thyristor-switched capacitors (TSC), and a 2 MVA thyristor switching reactor (TSR).

The Power Systems Engineering Services Department has also recently performed analysis for transient stability, voltage stability, voltage-reactive power (V-Q), and sensitivities of parameters for various FACTS controllers. For instance, a study was performed that examined a STATCOM and its interaction with a nearby HVDC system. Other examples of sensitivities for FACTS devices such as the STATCOM include the pre and post system with and without the STATCOM, interaction of STATCOM with neighboring generating stations, STATCOM gain settings, Var flow, and loading analysis. An example of a study where the thermal rating was the primary concern is a study that MEPPI performed to determine the required rating of a power flow controller/limiter to meet the thermal limits of an interconnection with new generation on-line.

In addition to these study types, MEPPI has also performed analysis with power flow and stability techniques for quantifying the impact new generator connections as well as for major transmission upgrades redefining various path flow ratings.

MEPPI has performed a wide variety of detailed studies. More information on specific analysis types is available upon request.