

Master Thesis Proposal: Implementation of STATCOM models in DlgSILENT PowerFactory and PSS®E

1 Introduction

In the last few years multilevel converter technology has started to be used together with Flexible AC Transmission Systems (FACTS) shunt compensators, thus static synchronous compensators (STATCOM) has become of interest for transmission systems operators (TSO). Present-day market received this message and, nowadays, STATCOMs are increasingly requested by many utilities worldwide.

Simulations are a vital part of the design and verification processes for both FACTS suppliers and TSOs. From the suppliers' point of view, it is important to verify that the design is compliant with the project specifications. While for the customer perspective, it is crucial to run system studies to verify the benefits derived by the STATCOM installation, and check that the guaranteed performance levels are satisfied.

In both cases STATCOM models play a key role, they need to fulfill specific simulation requirements, and to be as accurate as possible with regard of a particular simulation need.

STATCOM models used at ABB FACTS, for R&D and system optimization, are complex and not easily shared with customers. An alternative model was developed in DlgSILENT PowerFactory® in 2012. This is a simplified model, which is more user friendly, less complex and thereby suitable mainly for system studies of bigger networks, which would be the customers primary use of the model, but it is not as complete as the PSCAD based model.

2 Task Definition

The aim of this thesis work is to update the available DlgSILENT model, and develop a similar one in PSS®E.

It is proposed that the thesis will be carried out in two steps. The first consists in updating the DlgSILENT STATCOM model already available. Then, a study case will be defined and the updated model will be benchmarked against the detailed model available in PSCAD. The updated model could then be integrated into the base wind-farm model previously developed. Finally, the voltage source converter (VSC) harmonic characterization could be implemented into the model to validate the STATCOM harmonic performance.

During the second step, a similar model will be implemented in PSS®E. Finally, a study case will be defined to benchmark the developed model against the detailed model already available in PSCAD.

The student will learn about the existing control functions, models and tools, in close cooperation with an international R&D department

The thesis shall be concluded in a written report stating the results found during the work. Further the work shall be presented to involved parties at ABB.

2.1 Requirements

We expect a suitable background for this thesis project is in Applied Physics, Electrical Engineering or Power Systems Engineering with some experience in systems modeling and simulation.

2.2 Study time and place

The study will be performed, for about 5-6 months at ABB , Västerås, Sweden.

2.3 ABB contact person

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