EG2120 FACTS and HVDC in Electric Power Systems 7.5 credits

FACTS och HVDC i elkraftsystem

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for EG2120 valid from Spring 2015

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

EG2110 Power system stability and control, EJ2301 Power electronics, also documented proficiency in English B, English 6 or equivalent.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

To pass the course students need to show in a written report and orally that they are able to

• describe how FACTS and HVDC are designed,

• explain their functions and abilities,

• derive basic mathematical models for these components, and apply these models to load flow, modal analysis and transient stability analysis,

• present and apply different control strategies to these devices,

• present, describe and explain results of simulations about the impact of these devices on power system stability, and power oscillation damping,

• critically analyze other related projects.

Course contents

FACTS (Flexible AC Transmission System) and HVDC (High Voltage Direct Current) transmission are power electronics-based devices whose functions are to enhance the capacity, security and flexibility of power transmission systems. Application of these components in power systems implies an enhancement of transient and voltage stability, increase of power oscillation damping (POD) and improvement of power flow under undisturbed or post-fault conditions. The course starts with a short review of some issues (or problems) that an electric power system may face. Next it is discussed how these components are designed and what their main properties are. The following lectures focus on the use of the FACTS and HVDC transmission as technical solution to the issues described earlier. Basic mathematical models and control strategies used to analyze the impact of these devices on power system stability are presented. Most part of the analysis is dedicated to POD which is the main topic of this course. Lectures for the use of the main features of the necessary software are scheduled.

Disposition

Lectures, project work hours, and examination

Course literature

M. Ghandhari, et al., "The Impact of FACTS and HVDC Systems on Transient Stability and Power Oscillation Damping"

Examination

• PRO1 - Project, 7.5 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The examination consists of

P1. written report,

P2. written opposition, and also oral presentation and opposition.

Other requirements for final grade

Approved P1 and P2.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.