EG2070 FACTS and HVDC in Electric Power Systems 7.5 credits

FACTS and HVDC in Electric Power Systems

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

Establishment

Course syllabus for EG2070 valid from Spring 2014

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, EJ2300 Power electronics, also documented proficiency in English B or equivalent.

Language of instruction

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

Intended learning outcomes

To be able in a written report and orally 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) are controllable devices whose functions are to enhance the security, capacity and flexibility of power transmission systems. Application of these components in power systems implies an improvement of

- transient stability
- voltage stability
- damping of power oscillations
- optimal power flow

The course starts with a review of static and dynamic issues in power systems. As a technical solution to theses issues, FACTS and HVDC will be presented. It will be shown that FACTS and HVDC may be a technical solution to these issues. It will be discussed in the course how these components are designed and also what functions they have. Then, basic mathematical models and control strategies will be presented for these components to analyze the impact of theses components on power system stability.

Disposition

The course is given in English, and preliminary includes 14 lectures (28 h), 18 project work hours (36 h), 2 labs (8 h) and examination. During the supervising hours, the teaching assistants will be available to assist the students with the questions and preparatory work of the laboratories.

Course literature

"The Impact of FACTS and HVDC Systems on Transient Stability and Power Oscillation Damping"

M. Ghandhari, et. al

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Examination

- PROJ - Project, 6.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, 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 a project work (home exam) and is divided into three parts: written report, oral presentation and acting as an opponent to assess one of the other project works. Furthermore, there is some compulsory progress activities, where the student will show his/her progress in the project work.

Other requirements for final grade

Project (home exam), 6 (hp).
Two laboratory exercises (incl. compulsory preparatory work), 1.5 (hp).

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.