ELECTROMAGNETIC TRANSIENTS IN POWER SYSTEMS

Post-Graduate Course (6 cr)

Lecturer: **Mansour Hassan Abdel-Rahman**,
Professor at University of El-Mansoura, Egypt

Dates and Location:
28th – 30th September, 2009
At Helsinki University of Technology, Otaniemi, Otakaari 5 I,
Lecture Room I 345

Course Description

Electromagnetic transient assessments of power systems provide detailed technical information appropriate for power system equipment design and specifications pertaining to a wide-variety of phenomena related to power system voltage levels. This course explores the topic of transient problems on electric utility and industrial power systems. The purpose is to teach participants the fundamentals and to enable them to recognize and solve transient problems in power networks and components. The EMTP is a powerful tool used worldwide for the computer simulation of transients in power systems. The course stresses the physical aspects of the electromagnetic transient phenomena and also broadens the computational treatment of transients. The material is especially suited for those who analyze waveforms from transient recorders, those who conduct failure analysis, those who design and specify transmission and distribution systems and equipment and those who simulate transients with the EMTP.

Course Objectives

1. To understand electromagnetic transient phenomena.
2. To learn modeling techniques.
3. To introduce and use the ATP/EMTP software.

Literature

Recommended textbook:
Electrical Transients in Power Systems, Allan Greenwood, Second Edition. Wiley-Interscience, 1991
The course material will be available on CD.
Several of the assignments will require students to conduct transient simulations using the ATP/EMTP.

Day I
1. Introduction
2. Fundamentals of electrical transients
3. Basic simple switching transients
4. Abnormal switching transients
5. Introduction to the ATP/EMTP
6. Tutorial session with ATP/EMTP case studies.

Day II
7. Solution methods for electromagnetic transients
8. Transients in overhead transmission lines
9. Tutorial session with ATP/EMTP case studies.

Day III
10. Capacitor switching
11. Temporary overvoltages
12. Suppression methods for transients
13. Tutorial session with ATP/EMTP case studies.

The exam of the course will be on 6th October, 2009 at 09.00 a.m. to 2 p.m.

Enrolment to *Terhi Arvela before 20 September, 2009*
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Bibliography

Mansour H. Abdel-Rahman (M'79) was born in Egypt in 1947. He received the B.Sc. and M.Sc. degrees in electrical engineering from Cairo University in 1970 and 1975, respectively, and the Ph.D. degree in electrical engineering from the University of Manchester Institute of Science and Technology (UMIST), U.K., in 1979. He has been a Full Professor at the University of El-Mansoura, Egypt, since 1987. He spent visiting assignments, teaching and researching, at the University of Toronto, Canada, University of Windsor , Canada, the University of Cambridge, U.K., where he was a Fellow of Churchill College, University of Western Australia, Australia, Doshisha University, Japan, Helsinki University of Technology, Finland, University of Iceland, University of Aalborg, Denmark, Jordan University, Jordan, and Kuwait University, Kuwait. His research interests include electromagnetic transients in power system networks and machines, steady-state and dynamic analysis of power systems, and the application of artificial intelligence in power systems. Dr. Abdel-Rahman received the John Madsen Medal for the best paper submitted to the Institute of Engineers, Australia, in 1989, the IEEE Industry Application Society First Prize Paper in 1988, and the IEEE Industrial and Committee Prize Paper in 1987.