POWERFACTORY

Power System Stability

S2021.05.17.Online_Stab.En

May 17th - May 18th 2021

Online training course

The training introduces the participant to the tools and techniques commonly used in practice for stability studies. Single-machine and Multi-machine power systems are studied, using steady state, time-domain and frequency-domain techniques.

This two-day course provides a comprehensive overview about the dynamic models of elements and all the stability types:

- Transient Stability
- Oscillatory Stability
- Voltage Stability
- Frequency Stability

Each topic above includes a theoretical background and a practical part where participants acquire hands-on experience in the use of *PowerFactory*.

WHO SHOULD ATTEND:

The training course is intended for

- Utility engineers
- Power system operators
- Project developers
- Manufacturers
- Consultants
- Electrical engineers in general

Participants should be familiar with *PowerFactory* basics and should have some experience with *PowerFactory*'s time domain simulation functions or have attended the introductory course: "Time Domain Simulation in *PowerFactory*".

PRICE PER PARTICIPANT:

- 1,116.00€* (with valid maintenance contract)
- 1,270.00€* (without valid maintenance contract)
- 380.00€* (with valid student identification)

*Prices are exclusive of VAT

Training schedule

Central European Time (UTC +01:00)

DAY 1

9:00 Introduction to Power System Stability
Fundamentals of power system stability. Classification according to IEEE: rotor angle, voltage and frequency stability. Synchronous machine model.

10:00 Transient Stability
Fundamentals of transient stability. Equal Area Criterion. Methods for improving transient stability problems.

10:30 Coffee break

11:00 Exercise: Transient Stability in a SMIB
Studies in a Single-Machine-Infinite-Bus. Critical clearing time calculation. Visualisation and analysis of results. Effect of changing the initial point of operation.

11:45 Exercise: Transient Stability in a Multi-Machine Network
Critical clearing time calculation using a DPL script. Effect of the inertia and the impedance of the system on the transient stability problems. Calculation of the transfer limits.

12:30 Lunch break

13:30 Oscillatory Stability (small signal)
Description of the linearisation methods. Oscillatory stability in time and frequency domain analysis. Modal analysis and eigenvalue plot. Methods to improve small signal stability.

14:30 Exercise: Oscillatory Stability in a SMIB
Identification of the local mode of a single machine connected to an infinite bus. Analysis done in time and frequency-domain analysis. Impact of the AVR and PSS.

15:00 Coffee break

15:30 Exercise: Oscillatory Stability in a Multi-Machine Network
Identification of critical oscillation modes in a multi-machine network using modal analysis. Evaluation of the type of oscillation (local, inter-area). Methods to efficiently increase the damping. Impact of different network configurations on the oscillation modes.

17:00 End of the first day

DAY 2

9:00 Voltage Stability
Fundamentals. Causes and contributing factors in voltage stability problems. Classification of the voltage stability and tools used in every case: steady state and dynamic.

10:00 Exercise: Steady State Voltage Stability
Calculation of busbars sensitivities, PV & QV curves considering contingencies, effect of modifying the load size and power factor.

10:30 Coffee break

11:00 Exercise: Dynamic Voltage Stability
Study of voltage stability in the time domain analysis, RMS simulation. Effect of the load modelling, motors contribution and AVR dynamic response.

12:30 Lunch break

13:30 Frequency Stability
Fundamentals. Definition of the different stages of the frequency stability analysis and factors contributing in each stage: inertia, regulation actions and primary reserve, under-frequency load shedding.

15:00 Coffee break

15:30 Exercise: Frequency Stability in a Multi-Machine Network
Frequency stability after generators outages. Effect of primary control, load modelling, inertia, areas separation and load shedding. Comparison between different methods to improve frequency stability.

17:00 End of the training course

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