EMTP RV
The reference for power systems transients

5 day course
New Orleans, Louisiana - USA
December 12-16, 2011

Simulation and Analysis of Power System Transients using EMTP-RV

powersys solutions

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Simulation and Analysis of Power System Transients using EMTP-RV

Course objectives:

The objective of this course is to give to beginner and intermediate participants a good hands-on experience on the simulation and analysis of power systems transients in general. The course is based on the usage of EMTP-RV (www.emtp.com) for demonstrating concepts and teaching through practical problem cases.

EMTP-RV contributes greatly to the simplification of complex power system studies and to the visualization and accurate simulation of large systems.

Course structure:

The duration of the course is 5 days.
The course is presented in English.
The course starts at 9:00 a.m. and ends at 5:00 p.m. Monday 12th thru Friday 16th.

Lunch breaks are from noon to 1:00 p.m.

Each participant will have access to personal computer and EMTP-RV to learn about topics and to analyze available practical examples.

Location

The EMTP-RV course will be held December 12-16, 2011 at the JW Marriott Hotel New Orleans.

Address:

JW Marriott New Orleans
614 Canal Street
New Orleans, Louisiana 70130 USA

Phone: 1 (800) 228-9290 or (504) 525-6500
Fax: 1-504-525-8068

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Instructors

Douglas J. MADER, P. Eng
Director, IT Infrastructure and Enterprise Services
Entergy Services Inc
New Orleans, Louisiana, USA

Doug Mader began his career at the Nova Scotia Power Corporation. During his career at NSPC he rose to the position of Vice President Engineering of NS Power Services.

He moved to Entergy Transmission Business in June of 1998 as Director Value Engineering, and in 2000 took over responsibility for all Transmission Business Engineering, Project Management, and Construction functions.

In January of 2004 he was appointed Director, Technology Delivery and Business Unit CIO for Entergy transmission, and in October 2007 Director of IT Infrastructure and Enterprise Services for Entergy Corporation.

During his 35 years in the utility industry, Mr. Mader has worked in numerous aspects of power system engineering and analysis and has been involved in Electromagnetic Transients simulation for 28 years.

He has represented Canadian Electricity Association and its predecessor organizations on the EMTP DCG since its inception in 1982 and has been Chairman of DCG since 1988. Mr Mader has been a faculty member on numerous EMTP courses over this period.

Jean MAHSEREDJIAN
Professor
Ecole Polytechnique de Montreal,
Quebec, Canada

Jean Mahseredjian is the creator and main-developer of EMTP-RV.

From 1987 to 2004 he worked at IREQ (Hydro-Quebec) on research and development activities related to the simulation and analysis of electromagnetic transients.

He is currently with the faculty of electrical engineering at Ecole Polytechnique de Montreal, where he is pursuing research activities in the field of power system transients and power system analysis in general.

Jean has organized and participated in numerous courses on power system transients.

Additionally, Jean Mahseredjian served as chairman of the International Conference on Power Systems Transients (IPST 2005) in Montreal and was the technical co-chairman of IPST 2007 in Lyon, France.

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Course Schedule

Monday, December 12, 2011	
08:30 am - 09:00 am	Welcome and registration
09:05 am - 09:15 am	Opening remarks Mr David COTTINI, Sales Manager, POWERSYS Inc.
09:20 am - 10:30 am	Course
10:30 am	*Coffee break*
10:45 am - 12:00 am	Course
12:00 am - 01:00 pm	*Lunch*
02:00 pm - 03:30 pm	Course
03:45 pm	*Coffee break*
04:00 pm - 05:00 pm	Course
Tuesday, December 13, 2011	
09:00 am - 10:30 am	Course
10:30 am	*Coffee break*
10:45 am - 12:00 am	Course
12:00 am - 01:00 pm	*Lunch*
02:00 pm - 03:30 pm	Course
03:45 pm	*Coffee break*
04:00 pm - 05:00 pm	Course
Wednesday, December 14, 2011	
09:00 am - 10:30 am	Course
10:30 am	*Coffee break*
10:45 am - 12:00 am	Course
12:00 am - 01:00 pm	*Lunch*
02:00 pm - 03:30 pm	Course
03:45 pm	*Coffee break*
04:00 pm - 05:00 pm	Course
06:00 pm - 09:00 pm	**Special event:** New Orleans Steamboat Dinner/Jazz cruise with cocktail reception.
Thursday, December 15, 2011	
09:00 am - 10:30 am	Course
10:30 am	*Coffee break*
10:45 am - 12:00 am	Course
12:00 am - 01:00 pm	*Lunch*
02:00 pm - 03:30 pm	Course
03:45 pm	*Coffee break*
04:00 pm - 05:00 pm	Course
Friday, December 16, 2011	
09:00 am - 10:30 am	Course
10:30 am	*Coffee break*
10:45 am - 12:00 am	Course
12:00 am - 01:00 pm	*Lunch*
02:00 pm - 03:30 pm	Course
03:45 pm	*Coffee break*
04:00 pm - 05:00 pm	Course

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Course Agenda

Day 1 - Monday, December 12

Program

1. **Introduction to the program**
   - Welcoming remarks
   - What you can expect to learn

2. **Theoretical backgrounds on Power Systems and Transients**
   - Theoretical analysis methods
   - The range of problems and frequencies: lightning, switching and temporary overvoltages; electromechanical transients
   - Typical study cases

3. **Numerical methods for the simulation of transients**
   - Load-flow
   - Steady-state
   - Frequency scan
   - Initialization
   - Time-domain

4. **Introduction to EMTP-RV and EMTPWorks using examples**
   - Overview: devices, pins and signals
   - Power and Control devices
   - Device attributes
   - Basic scripting techniques
   - MPLOT and ScopeView

5. **EMTP-RV Simulation options**
   - Steady-state analysis and initialization
   - Numerical methods in time-domain computations
   - Solution of nonlinear devices

6. **Creation and maintenance of subnetworks**
   - Subnetwork uniqueness
   - Masking
   - Hierarchical designs: from small systems to large scale problems
   - Symbol editor
   - Password protection

7. **Creation and maintenance of libraries**

8. **Other options**
   - Available Libraries
   - Searching for devices
   - Error checking
   - Page setup, multipage designs

9. **Basic models: switches, RLC branches, ideal sources**

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Course Agenda

Day 2 - Tuesday, December 13

Program

1. **The library of control devices**
   - Measuring devices: power, voltage, current
   - Periodic meters, transformation functions
   - User-defined modeling

2. **Simulation of control systems**
   - Initialization methods
   - Examples: mean-value model, measuring power with variable frequency, variable inductance model

3. **Switching device models**
   - Application examples
   - Simulation of power electronics devices
   - Power converters and switching devices, Modeling issues
   - Line/self commuted systems

4. **Input impedance computation**

5. **Transmission/Distribution line models**
   - Theory and available models
   - PI-section, Constant Parameter model, Frequency dependent models
   - Corona model
   - Application examples

6. **Three-phase power-flow**
   - Methodology and setup options
   - Initialization

7. **Nonlinear devices**
   - Modeling in steady-state and time-domain
   - Application examples

8. **Transformer models**

9. **Synchronous and asynchronous machine models and related controls**
   - Available models
   - Case setup, controls and initialization
   - Startup from 0 Hz

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Course Agenda

Day 3 - Wednesday, December 14

Program

1. **The study of a complete system**
   - From load-flow to steady-state to time-domain
   - Initialization of machine controls
   - Switching transients
   - Temporary overvoltages

2. **Power system stability studies: electromechanical oscillations,**
   - Exciter, governor and stabilizer models.
   - Load model designs and applications.
   - Transmission case study.
   - Synchronous machine synchronization

3. **Statistical analysis methods**

4. **IEEE-34 bus distribution test case study**

5. **Introduction to Power Quality studies**
   - Case setup
   - Capacitor bank switching, voltage sags
   - Propagation of harmonics

6. **Insulation Coordination principles**
   - Voltage stresses within the system
   - Power Frequency Insulation and pollution
   - Lightning, switching and temporary overvoltages
   - Lightning arrester selection
   - Insulation coordination methodologies

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Course Agenda

Day 4 - Thursday, December 15

Program

1. **Insulation Coordination of a 230 kV Transmission System**
   - System setup
   - Power-flow and steady-state stability of the system
   - Statistical switching studies and line insulation
   - Temporary overvoltages, usage of line arresters and reclosing resistors
   - Ferroresonance and harmonic resonance
   - Lightning protection of substations

2. **Practical Power System Studies**
   - Insulation coordination of a 230-kV GIS
   - Transformer and capacitor bank switching
   - Temporary overvoltage cases - load rejection, self excitation, etc
   - TRV studies
   - Breaker failure analysis with detailed arc model

3. **Introduction to wind generator studies**
   - Model setup
   - Collector network
   - Grid code requirements
   - Typical cases

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Course Agenda

Day 5 - Friday, December 16

Program

Introduction to Advanced usage of EMTP-RV

1. **Quick introduction to JavaScript**

2. **EMTPWorks extensions to JavaScript**
   - Main objects
   - Methods for grabbing object data
   - Relations between objects
   - Devices, signals and pins
   - Available services

3. **Device search methods, looking into subnetworks**

4. **Device attributes: Data ad Methods**

5. **How devices are setup and how data is entered**

6. **Changing data without opening a device**

7. **Scripting device data**

8. **Programming masks from top-down, application examples.**

9. **Complete parametric study case:**
   - Step-by-step analysis
   - Changing data
   - Rerunning
   - Scripting with MPLOT

10. **DLL programming**
    - Advanced model development
    - Using Fortran
    - Using C++
    - Examples

Contacts:

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EMTP-RV Software

POWERSYS is the worldwide commercializer of EMTP-RV
For additional information about EMTP-RV:
www.emtp.com