Energy Consulting

PSLF Training

Engineering Analysis for Dynamic Stability

(4 Day Class – 28 Training Hours)

Training objectives:

The class presumes that its participants are familiar with and know how to run a "load flow/stability" program but does not require knowledge of any particular program. Much, but not all, of the discussion will be presented in terms of the GE PSLF/PSDS program.

This is not a class on program operation; no program operating instruction or exercises will be undertaken. The PSLF program will be used as convenient to illustrate engineering points.

The following list of subjects is an approximate anticipation of the class schedule. The actual schedule and emphasis placed on some subjects may vary in accordance with the general interests and concerns of the participants.

The course is intended for:

This class is intended for engineers who want to strengthen their knowledge background in the preparation of power system models for use in studies of the dynamics of the interconnected, transmission. The focus of the class is the characteristics of generating station and transmission control equipment rather than on planning criteria, methodologies, and techniques. The premise is that the planning and limit setting methods used in the industry can only be valid if they are executed with correct representations of the equipment that makes up the power system.

Main features:

Describing Things by Differential Equations
- A rocket trajectory
- Water in a penstock
- A governor
- Flux in a generator
- An excitation system

Numerical Issues
- Numerical integration
- Numerical stability
- Transient stability – Numerical formulation

Generator Modeling
- Physical characteristics of generators
- Generator parameters and sources of data
- Relationship of parameters to construction and type
- Apparent and true time constants

Excitation System Modeling
- The principal types
- Modeling of key components
- The IEEE Models
- Common pitfalls in the excitation system models

Tuning Excitation Systems/Governors/Stabilizers
- Very brief theory
- More on detecting bad data (finding needles in haystacks)
- Model components
- Illustrative examples

For more information visit: **www.geenergyconsulting.com**

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Motor Modeling
- Synchronous motors
- Induction motors
- Induction motor performance
- Induction motor parameters and sources of data
- Use of capacitors in relation to motors

DC Transmission, Inverter, FACTS Modeling
- Thyristor based devices
- DC transmission
- Controlled rectifier loads
- Gate Turn-off and transistor based devices
- Adjustable speed drives
  Controllable transmission system devices (FACTS)
- The data needed for modeling

Modeling Other Components and Effects
- Stabilizers/Relays/Inductionmotors/Governors
- Shaft torsional effects
- Self-Excitation effects
- Wind and photovoltaic models

Building a Practical Dynamic Simulation Model
- Getting an initial data base (it's a haystack)
- Getting going when data does not exist
- Valid and invalid initial conditions
- Notable problems (there are thorns in those haystacks)
- Finding the problems (needles in the haystack)

Interpreting the Results
- Recognizing valid and invalid dynamic results
- Transient stability
- Asymptotic stability
- Failure to maintain voltage

Testing to get Dynamics Data
- Caveats, realities of power plants, and limitations
- Component / system tests
- Test condition / normal service tests
- Test techniques

Other Topics
- Basic concepts of voltage stability
- Small signal stability

Recommended prior knowledge:

Background in power systems analysis, Bachelor's degree in electrical engineering or equivalent experience, Knowledge of a text editor such as Textpad, Familiarity with Microsoft®; Windows®.

Note: The course is held in English. Class subject to change. Class times are 8-5.

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