

PSLF Training

Geomagnetic Disturbances and Analysis in PSLF

(2 day Class – 8 Training Hours)

The course is intended for:

This class is intended for engineers.

Main Features:

Introduction to GMD phenomenon

- Solar storms
- Past GMD Events
- Influence of soil conductivity and geomagnetic latitude on GICs
- DC Voltage introduction due to uniform and non-uniform E-fields
- GMD data requirements

GIC Effects on Power Systems & Equipment

- Substation and ground resistivity modeling
- Transformer types and modeling in GMD studies

PSLF Exercises

- Starting from a power flow case
- GMD Database development
- Read/write GMD data functions
- How to use the data estimation tool
- Importing substation information
- Calculating GICs with uniform/non-uniform E-fields

GIC Impact on Power System & equipment

- Transformers
- Generators
- Shunt banks and SVCs
- Protective equipment
- Harmonics
- Other Equipment

Reactive power load in GIC-saturated transformers

- Concept of effective GIC
- Converting GICs into Vars
- GIC load representation in power flow
- Impact of saturated transformers on power flow analysis

PSLF Exercises

- Review of GMD test case developed
- GMD scenario development in PSLF
 - Uniform scenarios
 - Non-uniform scenarios
- GMD analysis and power flow simulations
- Reporting results

NERC Standards – what do you need to know to be compliant

- Review of NERC GMD Standards
 - EOP-010-1
 - TPL-007-1
 - Data gathering and responsibilities
 - Requirements for transformer owners and system planners

The NERC GMD storm benchmark

- GMD mitigation strategies
 - Transformer neutral and line protection
 - Neutral blocking devices
 - VAR compensation
 - Series compensation
 - The concept of E-field margin and how it relates to the NERC benchmark GMD storm in your area
- Transformer thermal analysis (hot spot identification)



PSLF Training

Mechanics of running GMD Analysis in PSLF

- Simulation of NERC benchmark storm for a medium case
- Data filtering and area reporting
- Analysis of transformer GIC currents and standard compliance
- Tips to solve Power flow solutions with GMD loads
- Evaluation of wide area system impacts in voltage and reactive power reserves

Voltage Stability Analysis under GMDs

- The use of EPCL for GMD analysis automation
- Impact of GMD loads on voltage stability margin – SSTOOLS
- Impact of GMD loads on voltage profiles
- Impact of GMD loads on system reactive power reserves
- Using ProvisoHD for result processing and visualization

PSLF advanced exercises

- EPCL automation and functions
- Data input/output using EPCL, and file read write functions
- GMD Data appending
- Evaluation of wide area system impacts in voltage and reactive power reserves
- Course evaluations and final discussions

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 am - noon, Pacific time.

For more information visit: www.geenergyconsulting.com

