Insulation Coordination Fundamentals Using ATP and ATPDraw
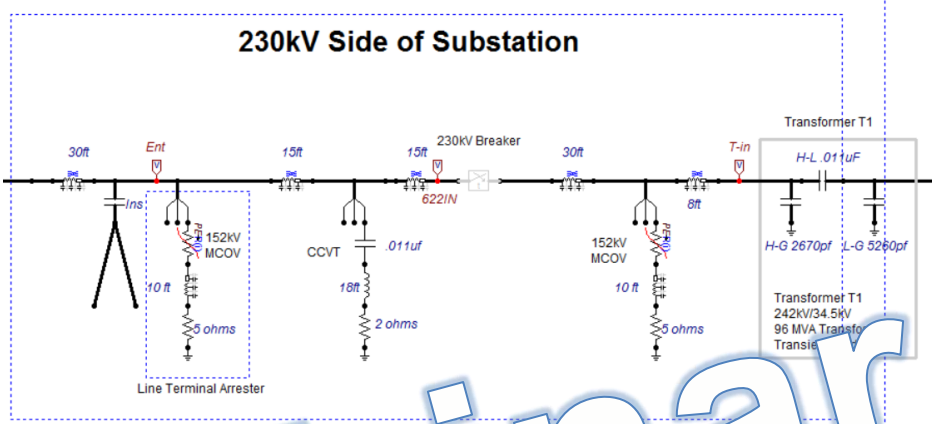

230kV Side of Substation
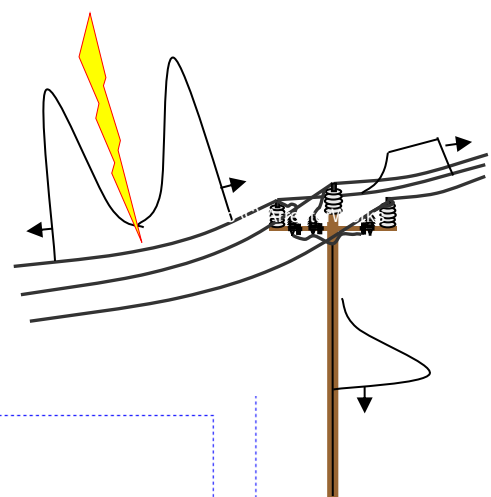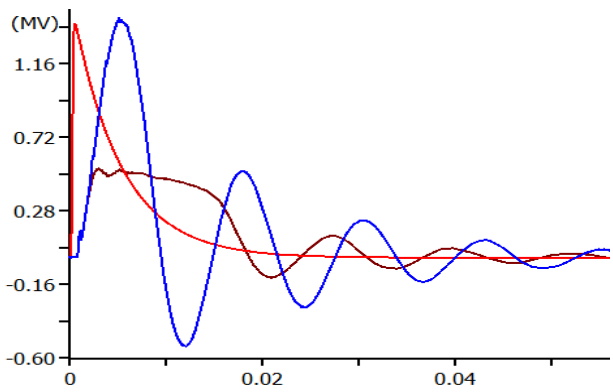
Webinar

Webinar Overview

This is a 10 hr webinar separated into 5 two hour sessions. The sessions are consecutive days with one weekend in the middle. If only one or two attendees are involved, the session times can be adjusted.
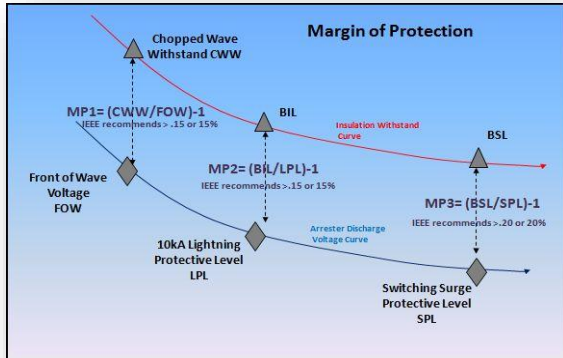
What Attendees Will Learn

• **Insulation Coordination Fundamentals**
• **How to Use ATP, ATPDraw and XY-Plot**
• **Surge fundamentals**: lightning, switching, faults, ferroresonance, line drops, and others
• **The difference between arrester types**: Station, transmission line, distribution, secondary, liquid immersed, elbow, riser pole, and more
• **What the ratings of an arrester really mean** and how to get data for ATP from manufacturers datasheets
• **Margin of protection fundamentals** along with insulation coordination fundamentals

One of the following three Studies will be completed

• Station Study Using ATP
• Distribution System using ATP
• Transmission Line Study Using ATP

CEU Credits for 14 hrs are given to those interested

Prerequisite

1. All students should have working ATP, ATPDraw and XY-Plot packages installed on their computers. Or your own transient software package to run simulations on.
2. Fast Internet line that can handle video conferencing.
3. 2-3hour time slots once a week for 5 weeks. .
4. Time to do homework between sessions.

Materials

Each attendee will receive an
1. Insulation Coordination workbook based on the slide presentation that can be used as a reference for years to come.
2. Several transient models that can be used for future studies
3. Numerous Excel Based Tools that can be used in studies.

Who Should Attend

• Anyone wishing to learn how to run an insulation coordination study using ATP and ATPDraw software.
• Anyone wishing to learn insulation coordination principles and has access to other simulation software that can run transient analysis.

Instructor

Jonathan Woodworth, Consulting Engineer, ArresterWorks, started his career at Fermi National Accelerator Laboratory in Batavia, IL after receiving his Bachelor's degree in Electronic Engineering from The Ohio Institute of Technology in 1972. As an Engineering Physicist at Fermi Lab, he was an integral member of the high energy particle physics team in search of the elusive quark. In 1979 he joined the design engineering team at McGraw Edison (later Cooper Power Systems) in Olean, NY. Returning to school after many years in industry, Jonathan received his MBA from St. Bonaventure University in 1995. Jonathan was employed for 28 years at Cooper Power System where he served as Engineering Manager for 13 years. Additionally, he held the position of Arrester Marketing Manager for 7 years.

In 2007 Jonathan along with business and life partner Deborah Limburg started up Arrester Works a surge protecting Consultantsy that serves the surge protection industry worldwide.

Jonathan is very active in the IEEE and IEC standard associations previously serving as Chair of the Surge Protective Devices Committee of IEEE PES, Past Chair of the NEMA High Voltage Arrester Section, and currently Co-Convener of the IECTC37 MT4 committee responsible for IEC Arrester Standards and Convenor of the IEEE High Voltage Arrester Test Standard Working Group.

Jonathan can be contacted at
jwoodworth@arresterworks.com

Insulation Coordination Webinar Outline

Chapter 1: Insulation Coordination Fundamentals - 2hr
    Introduction to Insulation Coordination Studies
    Definitions , Types, Parameters, Purposes
    Examples of an Insulation Coordination Study
    Basic Substation , Complex Substation, Transmission Line
    System Fundamentals Relative to Insulation Coordination
    Homework

Chapter 2: Surge, Insulator and Arrester Fundamentals - 2 hrs
    Surge Fundamentals
        Lightning Surge
        Switching Surge
        Back Flash Surge
    Insulation Fundamentals
        Types of Insulation
        Equipment Withstand Characteristics
        BIL/CFO
        BSL
        Chopped Wave Withstand
        Modeling Insulators
        Power Frequency Flashover
    Surge Arrester Fundamentals
        Examples of Arrester Applications
        Arrester Classifications
        Arrester Design Overview
        Arrester Characteristics
        Margin of Protection
        Modeling an Arrester
    Homework

Chapter 3: Arrester Fundamentals Relative to Insulation Coordination - 2 hrs
    Model Preparation
        Defining/Collecting Input Data
        Define Reliability Targets Assumptions
        Calculate Incoming Surge Rate of Rise
    Model Creation
        Converting Drawings into Model
        Verifying Model
        Run Preliminary Scenarios
    Study Procedures
        Determine worst case Scenarios
        Running Scenarios
        Tabulating Data
        Calculating Margins
        Recommending Mitigations
    Homework

Chapter 4: Using ATP and ATP Draw for transient studies - 2 hrs
    Defining/Collecting Input Data
    Define Reliability Targets
      BFR
      SFFOR
    Create and Verify Model
      Insulator
      Arrester
      Tower and Ground
    Determine Critical Current
    Run Scenarios
    Calculate Outage Rates
    Homework

Chapter 5: Substation Insulation Coordination Studies - 2 hrs
Distribution Transformer Protection
URD Cable Protection
    End points
    Sheath Protection
Papermill Study Example
Second Look at BFR of Transmission lines