Workshop 1 Temporary Overvoltages (TOV) – Introduction to ATPDraw

Date:
Name:

1.1 Installation ATP-Draw

✓ Create the following three folders (please, use the same directory's structure)

- c:/eeug/atpdraw
- c:/eeug/solver
- c:/eeug/plotter
- c:/eeug/results

✓ Unzipped the following files into each specific folder (see the table below).

Filename	Local directory
SetupATP_Draw.zip	c:/eeug/atpdraw
ATP_solver2021.zip	c:/eeug/solver
PlotXY2021.zip	c:/eeug/plotter

✓ Install the unzipped version 7.3 of ATPDraw on the "**c:/eeug/atpdraw**" route.

✓ Start ATPDraw and select "**ATP| Setup ATP Connection**" (or simply press **F10**).
**Note**: Denny any message related with create folders.

- **Step 1: Select Solver ATP**. Select the solver program "**tpgigm.exe**" located on "c:/eeug/solver". Do not type in the names, **use the browse buttons**. tpgig.exe is the giga-version with maximum capabilities.

- **Step 2: Set environment variables: STARTUP**. Uncheck set externally and check 'Same as Solver'. The file STARTUP is the initialization file of the solver, typically located in the same location as the Solver. In special cases the STARTUP. file needs to be edited in a text editor, most frequently NEWPL4 that should be 2.

- **Step 3: Set output** Initially for debugging purpose, 'Printout to screen' should be checked

- **Step 4. Set execution mode**. 'Execute solver in hidden mode' unchecked.

o **Step 5: Default result directory: Results**. Specify the folder results located on "c:/eeug/results" where the results should go. You must have writing privileges and avoid space in the folder name. By default all simulation results (atp, lib/pch, lis, pl4) go here. The content of this folder grows over time and it needs to cleaned, thus avoid adding private files of value to this folder. Some users like to merge project files and result files, I do not. I like to be able delete all files in Results from time to time, but this is matter of personal style.

o **Step 6: Plotting program: Plotter**. Specify the plotting program PlotXY.exe/PlotWinXY.exe located on (c:/eeug/plotter). Do not type in the names, use the browse buttons.

✓ Click Save to store the settings in atpdraw.ini.

1.2 First simulation

We will simulate a simple circuit composed by a voltage source and a RLC branch.
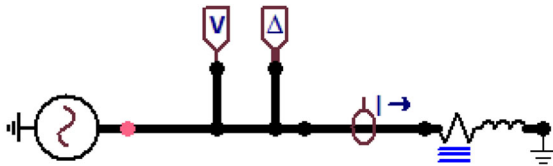
-Voltage source (ACSOURCE): 10000 V (RMS L-L), 3-phase, 50 Hz. Name its node as 'grid'
-RLC (RLC3): R:10 ohm, L=100mH, C=0 uF.
-Add a *Probe Voltage* and a *Probe Line volt.* probes. Remember to double click to activate the three phases.

Simulation settings: Time domain, delta T=1e-5 s and Tmax=0.2 s.

Plot phase and line voltages as well currents. Practice with the output (voltage and current) of the RLC.

1.3 Temporary overvoltage (TOV) due to a single-phase fault

This example will be used to introduce ATP-Draw. We wish to investigate the TOV due to single-phase fault.
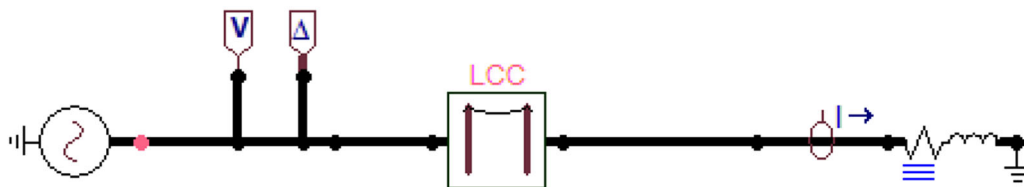
From the previous model, add a LCC-Template line. Double click on it and set:
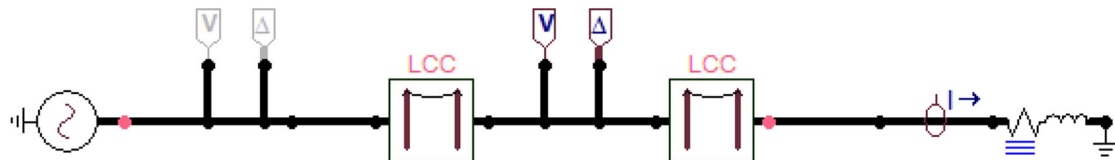 Name: LINE1
 Length: 10 km
 Skin effect
Go to Data tab and set the Horiz to -1, 0 and 1 (note that there is an error because all the wires are at 0).


Now simulate and verify that the model has no any problem.

Add a second line with the same properties as the previous one.

Now simulate and verify that the model has no any problem. You can practice with 'hide' of the voltage probes at the grid.

Now add a splitter, a switch time controlled and a resistor. Set a value of 1 Ohm for the resistor. Configure the switch to close at 0.05 s and open at 0.2 s.
Set the Simulation settings to deltaT=1E-6 and Tmax to 0.4
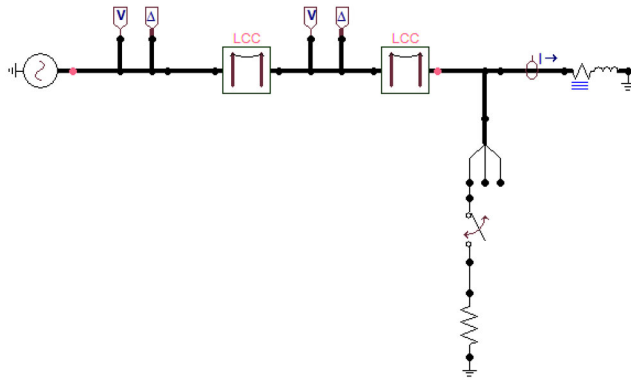
Question 1: Investigate the TOV at the grid side, between the lines and at the load. Discuss the effect of the fault resistance and the lengths of the lines.

Respond here including plots

1.4 Temporary overvoltage (TOV) due to load rejection

Now, we will investigate the resulting TOV due to load rejection. Add a switch time controlled. Set it for as a three phase and set to open at 0.1 s. Set the load resistor to 1 Ohm.
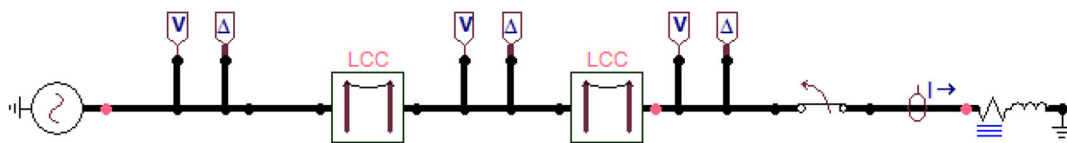
Question 2: Investigate the TOV at the grid side, between the lines and at the load side (right side of the switch). Discuss the effect of the load current and the lengths of the lines.

Respond here including plots