

Creating a simple circuit

Exemplo para a aula

Aim

- ▶ This practice provides a step-by-step description of creating a simple circuit model from scratch. The circuit will include a **substation**, **transformer**, **line**, **bus** and **load**.

Adding a Substation

- The first step to creating a model in OpenDSS-G is to define the reference bus of the circuit, which is the bus to which the substation will be connected. From the Tools Palette, click on the New Bus command, as shown in Fig.1(a).

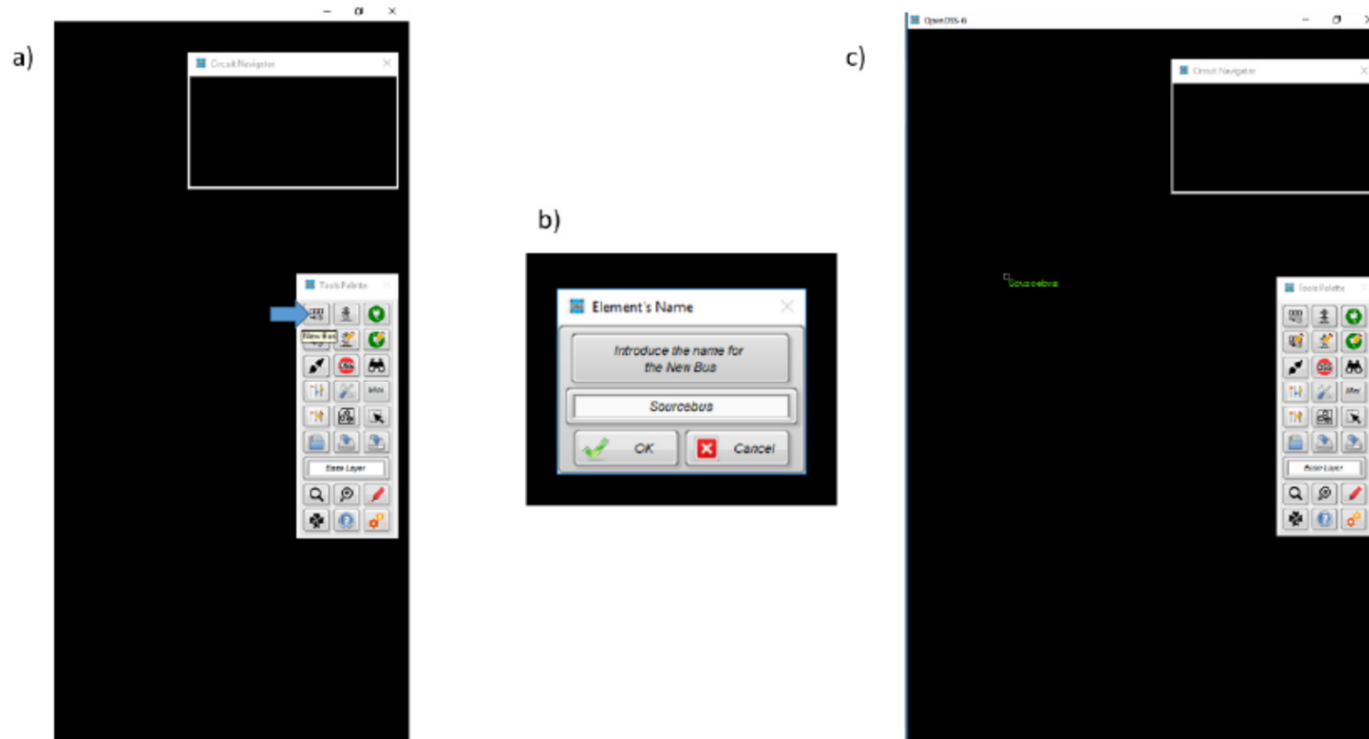


Fig.1 Creating the reference bus

- ▶ After this operation, a dialog window will appear asking for the name of the new bus; in this case, the bus will be called Sourcebus. By clicking the OK button, as shown in Fig.1 (b), OpenDSS-G allows the user to place the bus in the Graphical panel, as shown in Fig.1 (c). With the reference bus, it is possible to add a substation.
- ▶ To add the substation, click on the New PCE menu and select the Substation, as shown in Fig.2 (a). The substation editing form will appear to set up the new substation. The values inserted are the ones shown in Fig.2 (b), with the undefined values adopting the OpenDSS default values if needed.

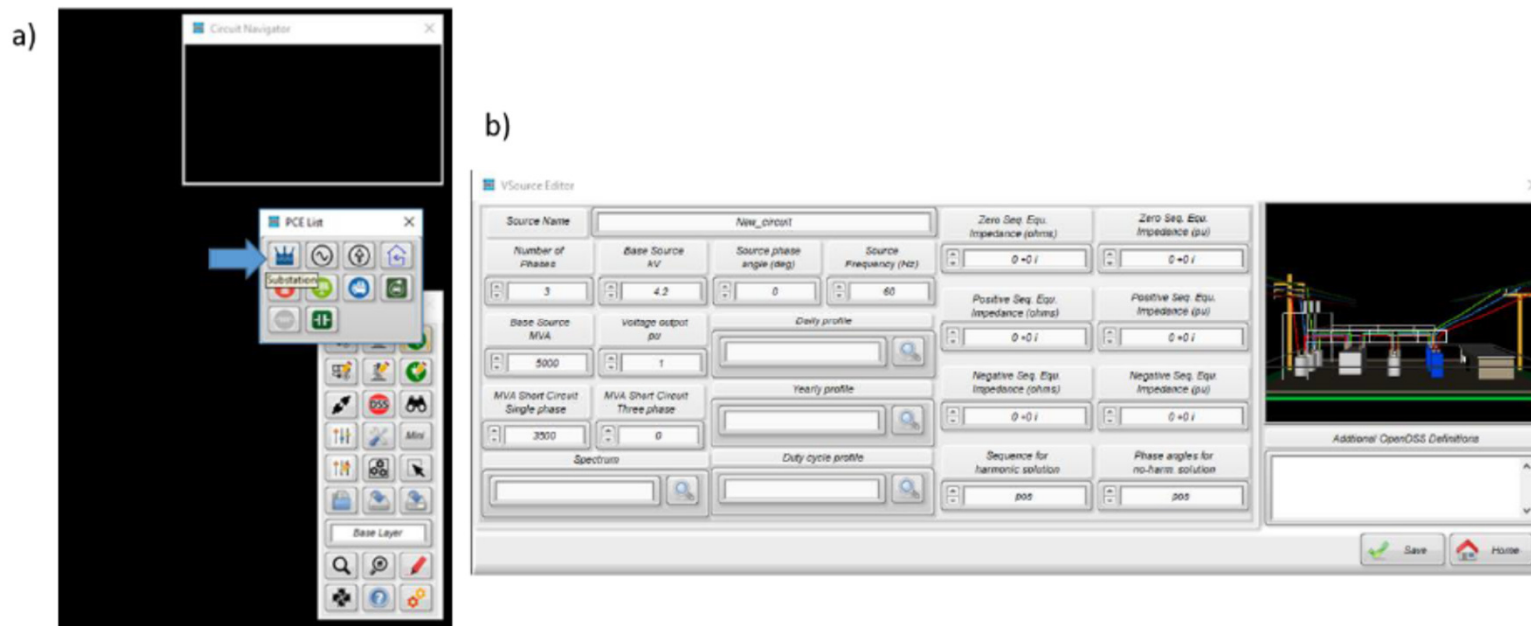
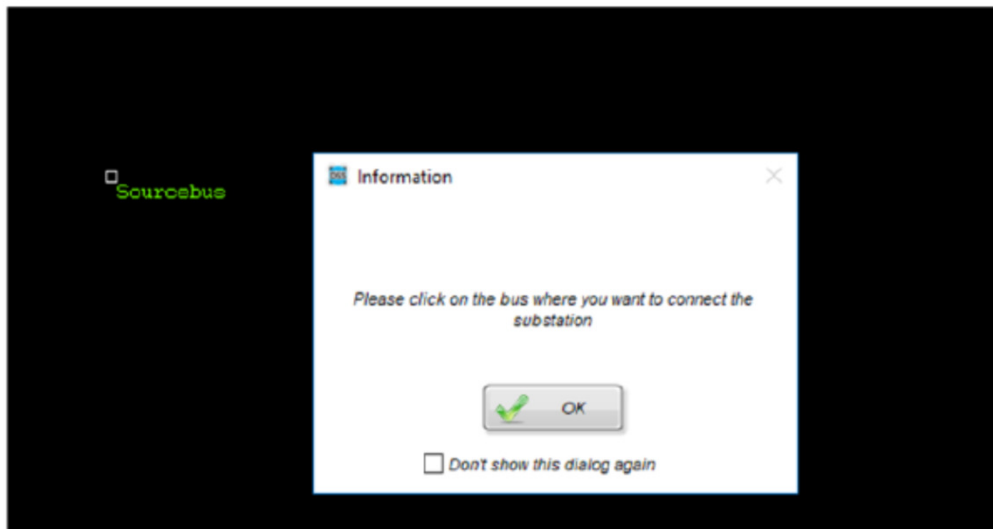


Fig.2 Adding a substation

- OpenDSS-G will allow the user to click on the destination bus, which is Source bus in this case, by clicking on the Save button shown in Fig.2 (b). Following this action, a new dialog will appear for specifying the way the terminals of the substation are connected to the bus. In this example, the terminals will be connected one-to-one from the substation terminals to the bus nodes, as shown in Fig.3 (a). Fig.3 (b) displays the window that will pop up for defining the substation's connection to the bus.

a)



b)

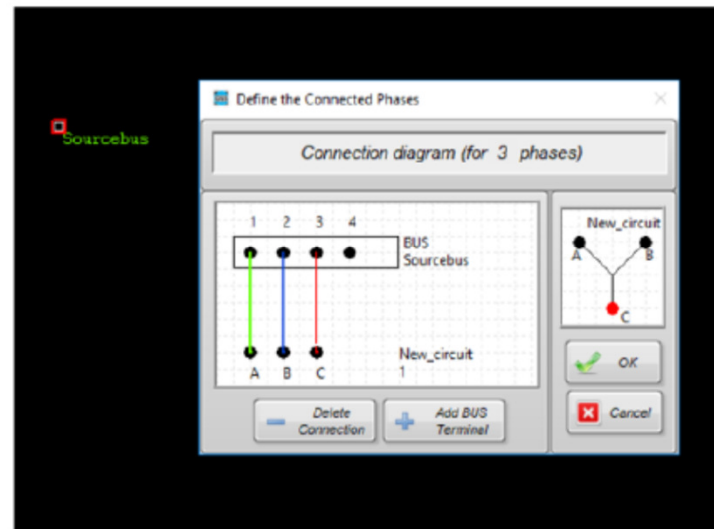
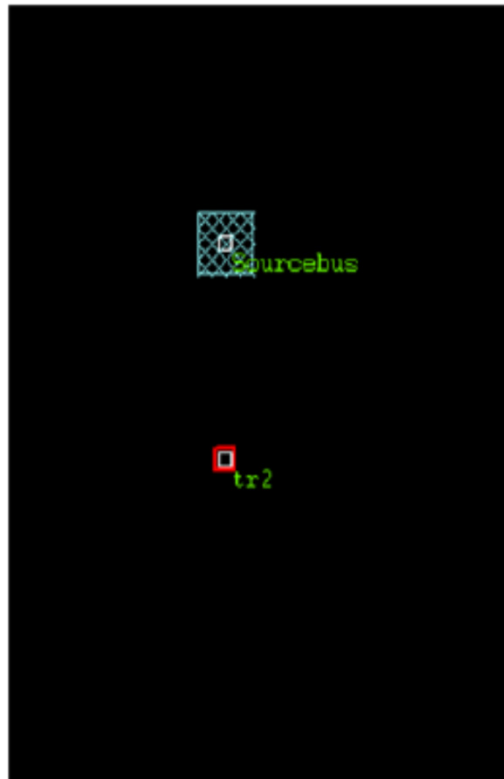


Fig.3 Placing the substation

Adding a Transformer

- ▶ The next step is to create and place the transformer. The transformer will be a step-down wye-wye transformer from 4.2 kV to 480 V.
- ▶ Before creating the transformer, the user must create another bus to connect the transformer secondary (second terminal). The second bus is called tr2 in this example as shown in Fig.4 (a).
- ▶ To create the new transformer, the PDE menu must be used as shown in Fig. 4 (b). The transformer can be configured using the information provided in Fig.4 (b).
- ▶ The new transformer will be added to the model as shown in Fig.5.

a)



b)

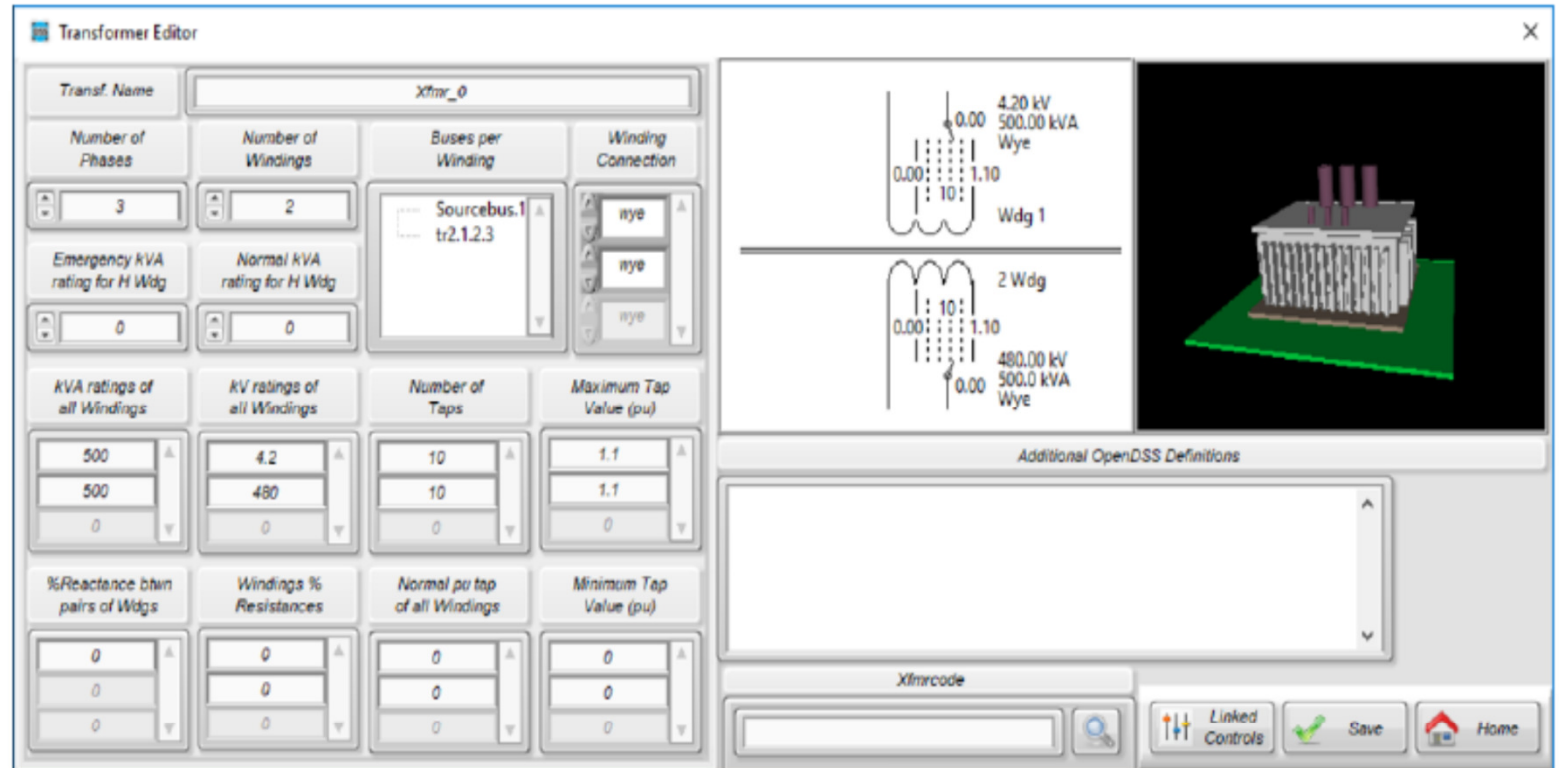


Fig.4 Adding a transformer to the model

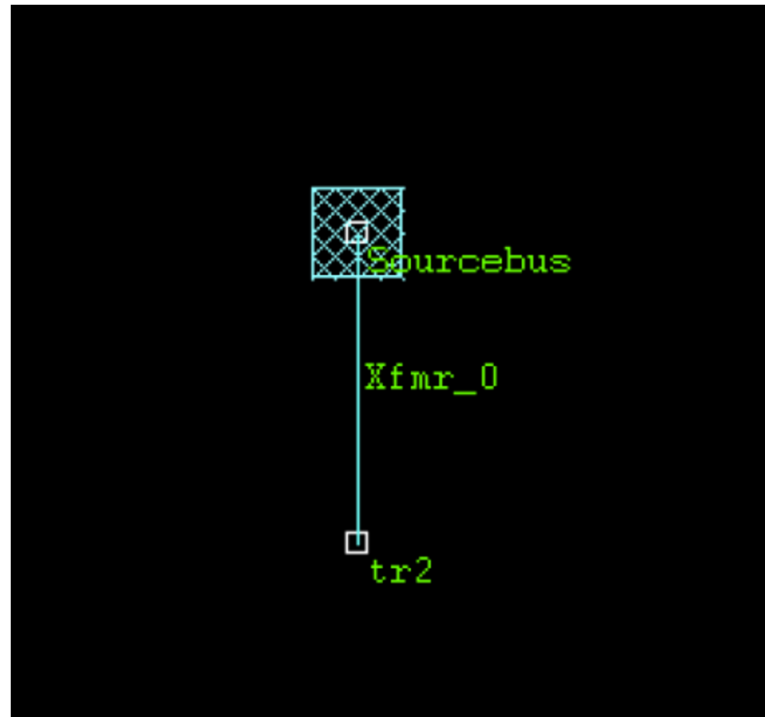


Fig.5 Substation and transformer added to the model

Adding a Line

- To add a line, it is necessary to create a new bus in order to have a destination bus when creating the line. The new bus is called ld1 in this example as shown in Fig.6.

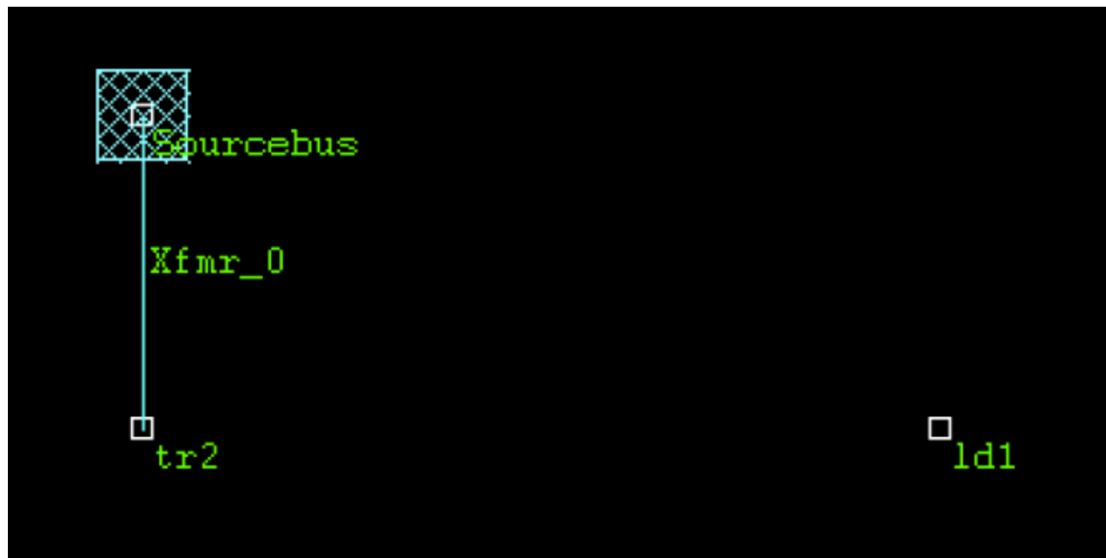


Fig.6. New bus added to the model for placing a line

- After adding the bus Id1, click on the PDE menu to add a new line as shown in Fig.7 (a). Configure the line considering the desired features for the line; in this example, the line has been configured as shown in Fig.7 (b).

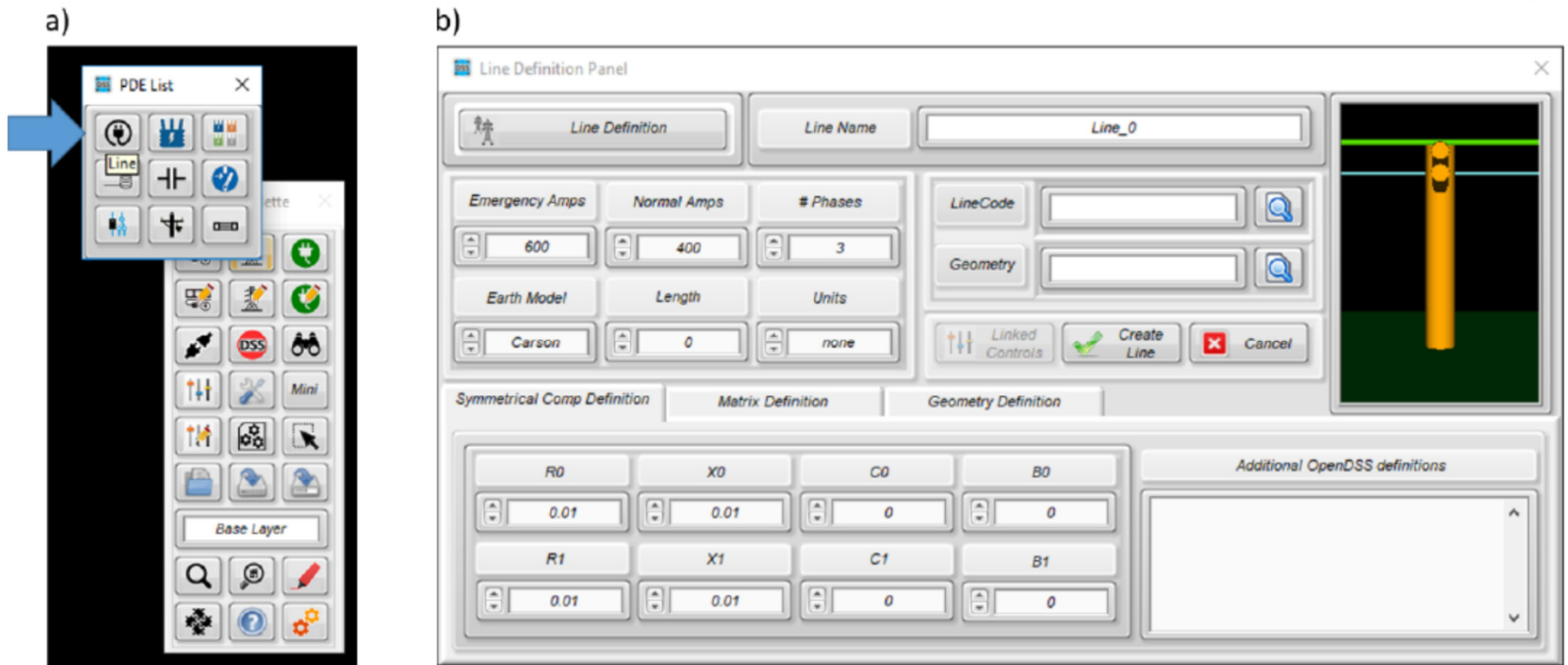
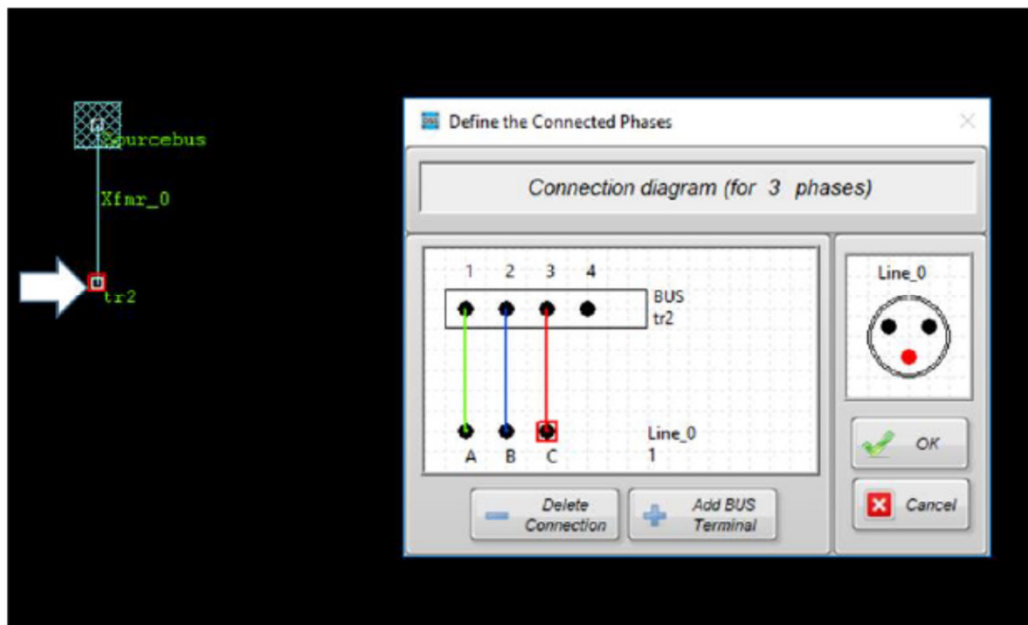


Fig.7 Adding a line to the model

- ▶ Clicking the Create Line button will enable the user to draw the line in the Graphical panel using the mouse cursor. First, click on the bus called tr2 and specify the connection as shown in Fig.8 (a). Then, click on the bus ld1, as shown in Fig.8 (b), and specify the connection of the line in the same way the previous terminal was defined.

a)



b)

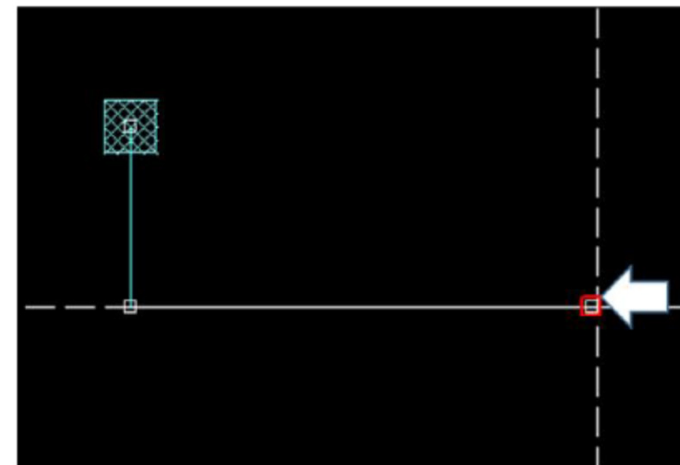


Fig.8 Placing the line in the model

- The final result of placing the line is shown in Fig.9.

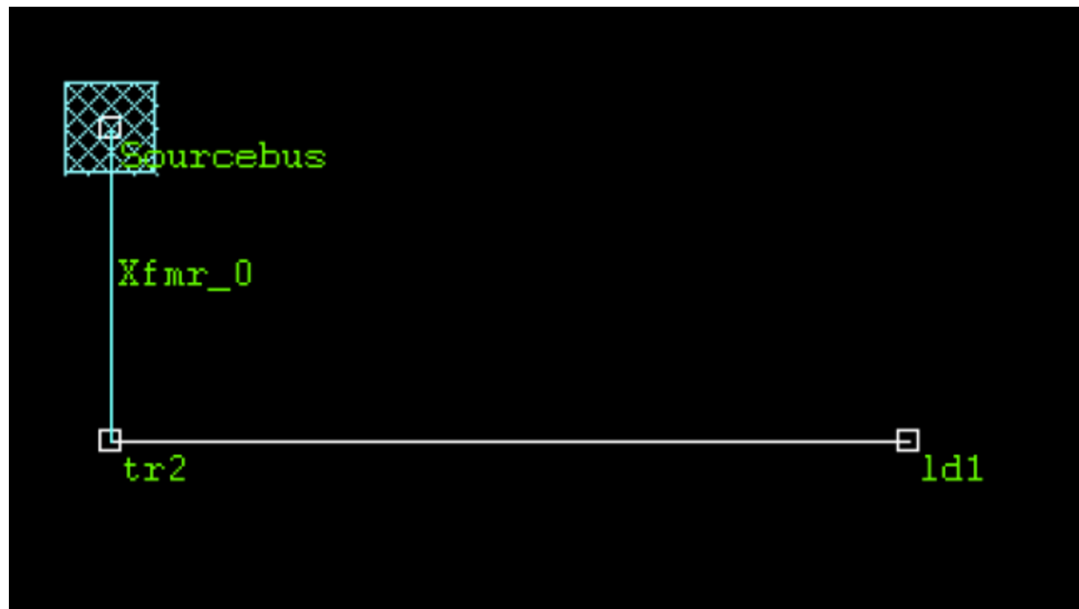


Fig.9. Substation, transformer, and line placed

Adding a Load

- ▶ The model should be saved before adding the PCE. This way, the system will be notified that there is a system in memory. To add a load, click on the PCE menu and select a new load, as shown in Fig.10 (a). The load creation panel will appear, and all the features of the load can be defined. In this example, the load is configured as shown in Fig.10 (b).
- ▶ After configuring the load, click on the Save button. OpenDSS-G will expect the user to click on the destination bus for the load, which is ld1 in this case. After clicking on the bus ld1, the same dialog shown in Fig.8 (a) will appear to allow the user to specify the load connection to the bus. Once this operation is performed, the model is ready for simulation.

a)



b)

Load Name	Ld_0					Num. of customers	1
Number of phases	Nominal Rated kV (2 and 3 Ph LL)	Base load in kVA	Load kW	Load kvars	Power factor		
3	480	50	0	0	0.95		
Connection Type	Max. pu voltage for the model	Daily Profile		Spectrum			
wye	1						
Load model	Min. pu voltage for the model	Yearly Profile		Duty Cycle Profile			
Standar	0						
% Reduction in W per 1% in V	% Reduction in vars per 1% in V	Watt and var factors in time		Growth Factors per year			
0	0						

Fig. 10 Configuring the new load