

Module 5 Lab: Mesh and Nodal Analysis

The purpose of this lab is to investigate the technique of Mesh and Nodal Analysis to analyze electrical circuits.

1. Mesh Analysis Calculations

1.1 Consider the circuit shown in Figure 1.

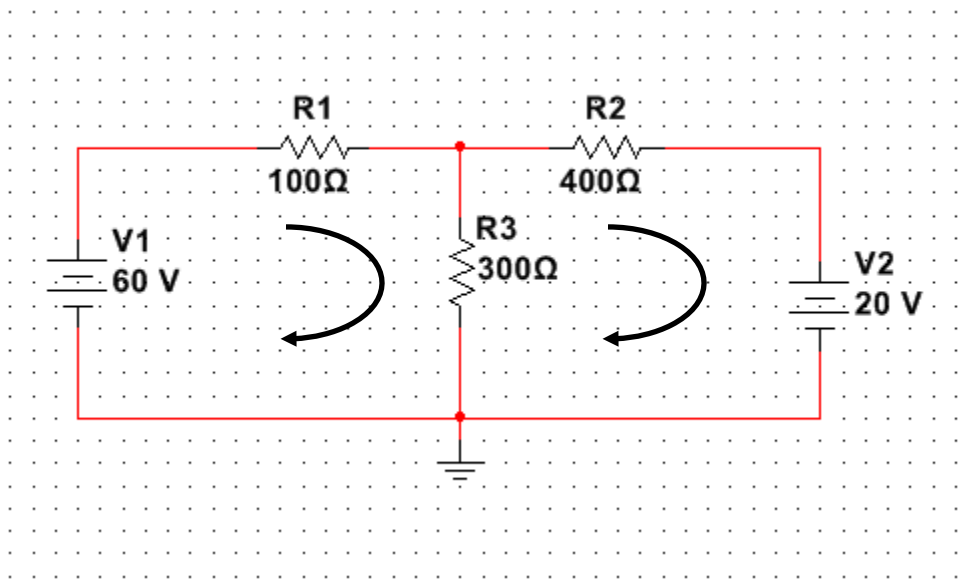


Figure 1: Circuit for Mesh Analysis

1.2 Write the equations for the two mesh currents.

1.3 Solve the equations and find the values of the following currents:

Calculated Values				
I out 60 V Source	I R1	I R2	I R3	I in 20 V Source

1.4 Build the circuit in Multisim and measure the current values. Complete the table below.

Measured Values				
I out 60 V Source	I R1	I R2	I R3	I in 20 V Source

1.5 Are these values similar? Explain your results.

2. Nodal Analysis Calculations

2.1 Consider the circuit shown in Figure 2.

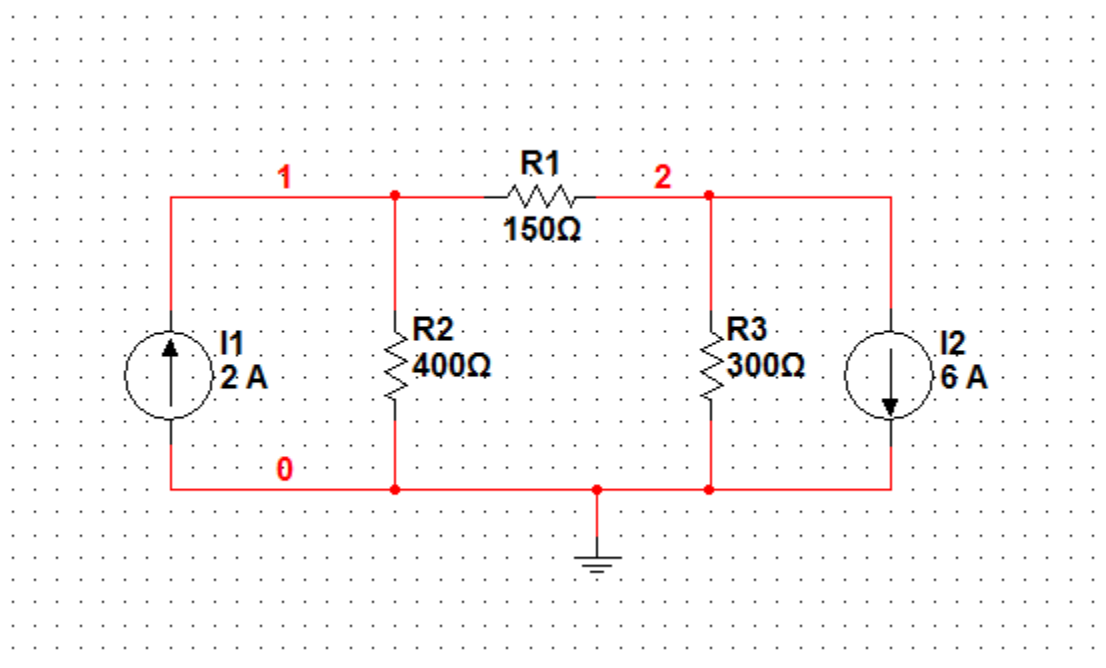


Figure 2. Circuit for Nodal Analysis

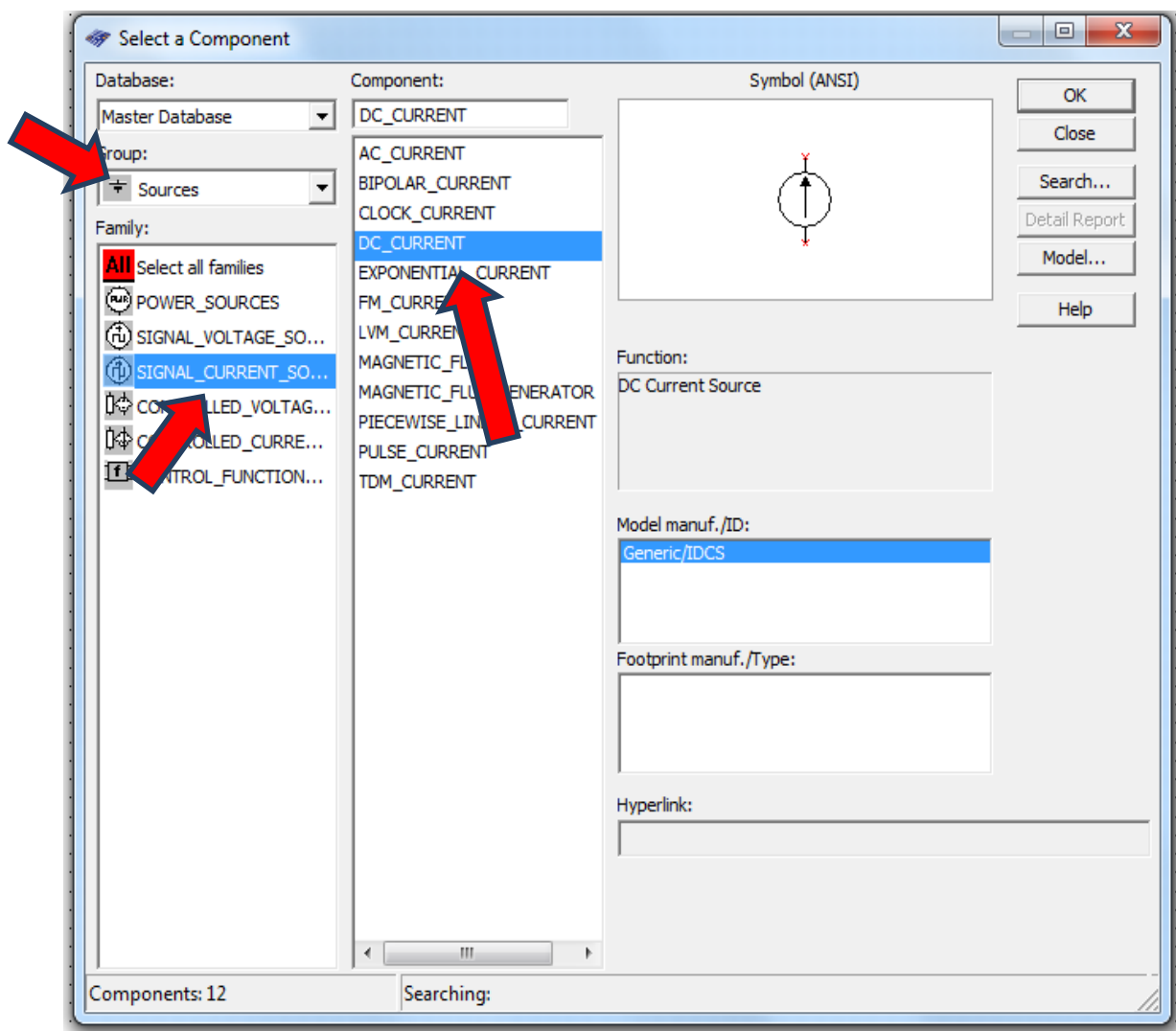
2.2 Write the Nodal Equations for this circuit.

2.3 Solve the Nodal Equations in order to find the two unknown Nodal Voltages.

V1 =

V2 =

2.4 We will now proceed to building the circuit from Figure 2. This circuit uses a new element, the Current Source. Figure 3 below shows the location of the current source in Multisim. After the source has been placed, double clicking it will allow changing some of its parameters, in particular the value of the current.



2.5 Build the circuit in Multisim and measure the values of the 2 Nodal Voltages:

V1 =

V2 =

2.6 Compare these results with the expected results from Section 2.3. Are they similar? Comment on your results.

3. Laboratory Report

Create a laboratory report using Word or another word processing software that contains at least these elements:

- Introduction: What is the purpose of this laboratory experiment?
- Results for each section: Measured and calculated values, calculations, etc., following the outline. Include screenshots for the circuits and waveforms as necessary -- You can press Alt + Print_Screen inside Multisim, or if using Windows 7, you can use the "Snipping tool." Either way, you can paste these figures into your word processor. Also include here the charts and graphs that you have created with the data you have collected.
- Conclusion: What area(s) you had difficulties with in the lab; what you learned in this experiment; how it applies to your coursework and any other comments.