

# **Node Voltage Method and Mesh Current Method in DC circuit**

## 1. Scope

Solve the DC circuits with the node voltage and mesh current methods. Made basics measurement of current and voltage. Simulate circuits in Matlab.

## 2. Solve the DC circuit

Calculate the current and voltage on each resistors in following circuit. Note value of elements:

R1=..... R2=..... R3=..... R4=..... R5=..... R6=.....  
 E1=..... E2=..... E3=.....

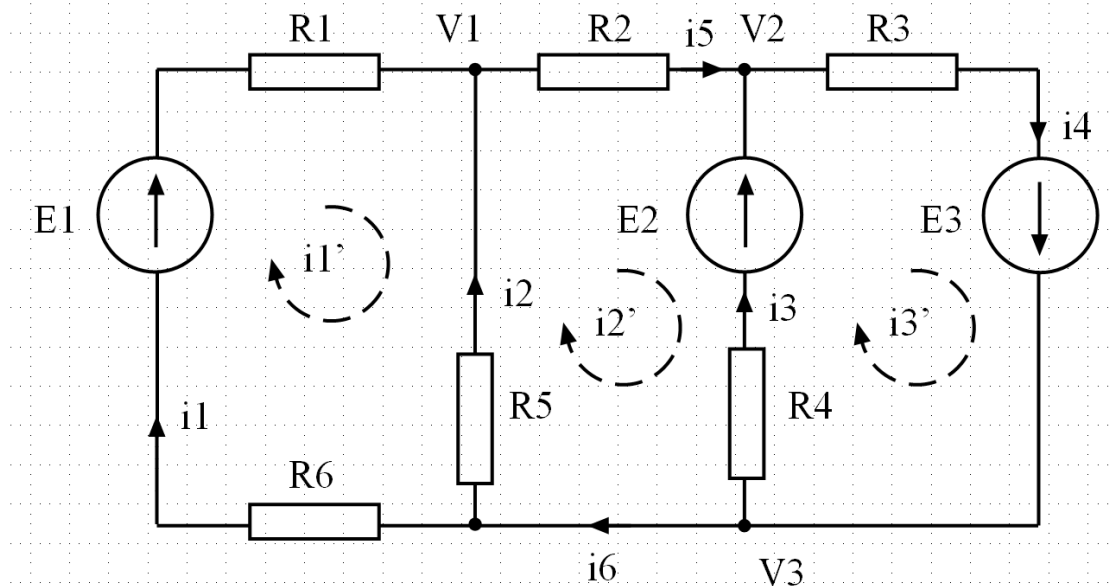


Fig. 1 Schematic of the DC circuit

- Solve circuit with use of node voltage method:  
Write matrix/vector **G** and **Is**

$$\mathbf{G}=[ ]$$

$$\mathbf{Is}=[ ]$$

Calculate and write node voltage vector  $\mathbf{U}=\mathbf{G}^{-1}\mathbf{Is}$

Calculate and write  $i_1, i_2, \dots$

- Solve circuit with use of mesh current method:  
Write matrix/vector  $\mathbf{R}$  and  $\mathbf{E}$

$$\mathbf{R}=[ ]$$

$$\mathbf{E}=[ ]$$

Calculate and write  $\mathbf{i}'=\mathbf{R}^{-1}\mathbf{E}=\mathbf{i}$

Calculate and write  $i_1, i_2, \dots$

Calculate and write  $V_1, V_2, \dots$

### 3. Numerical simulation of DC circuit

Build following Simulink diagram (use elements from SimScape library)

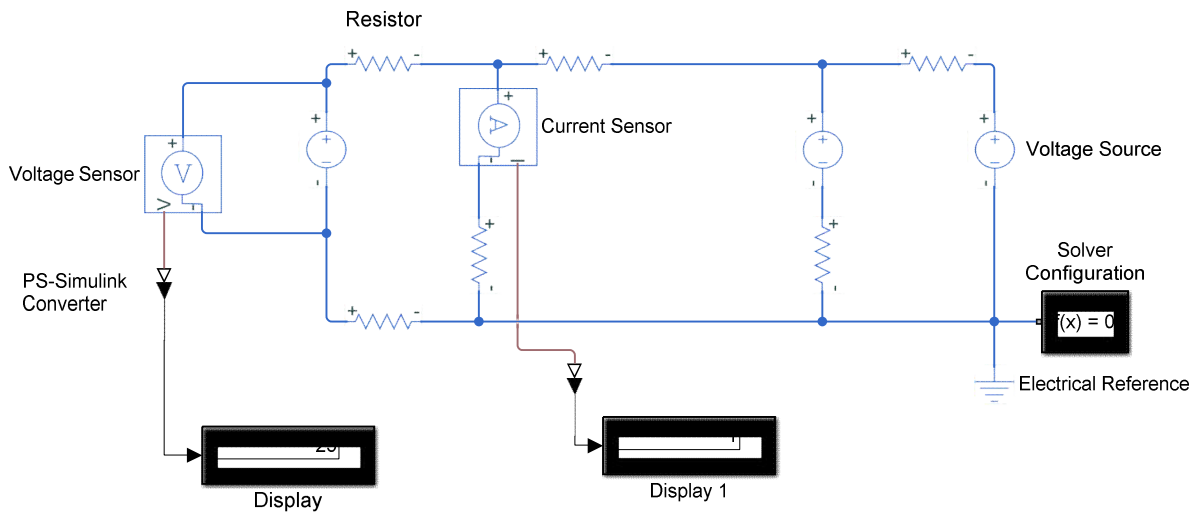


Fig. 2 Simulink diagram

Compare analytic results with Simulink outputs. If it is necessary find error and correct calculations.

#### **4. Measurements in DC circuit**

Build real DC circuit according to the schematic in Fig.1.

Measure the current and voltage in the system.

Note down and comment the results.

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