

Dependent sources

This example showcases how ELABorate deals with circuits containing dependent sources.

Voltage-Controlled-Voltage-Sources

```
circuit_1 = Circuit('circuits/E_src.txt');  
circuit_1.list
```

```
ans =  
    'V1 1 0 DC 12  
    R1 1 2 1000  
    R2 2 0 1500  
    R3 3 0 5000  
    Ea 3 2 1 2 g  
,
```

```
ELAB.analyze(circuit_1)
```

Symbolic analysis successful (0.348103 sec).

```
circuit_1.symbolic_node_voltages
```

```
ans =  

$$\begin{pmatrix} v_1 = V_1 \\ v_2 = \frac{R_2 V_1 (R_3 - Ea R_1)}{R_1 R_2 + R_1 R_3 + R_2 R_3 - Ea R_1 R_2} \\ v_3 = \frac{R_3 V_1 (R_2 + Ea R_1)}{R_1 R_2 + R_1 R_3 + R_2 R_3 - Ea R_1 R_2} \end{pmatrix}$$

```

Voltage-Controlled-Current-Sources

```
circuit_2 = Circuit('circuits/G_src.txt');  
circuit_2.list
```

```
ans =  
    'V1 1 0 DC 12  
    R1 1 2 1000  
    R2 2 0 1000  
    R3 3 0 8000  
    Ga 3 2 1 2 100  
,
```

```
ELAB.analyze(circuit_2)
```

Symbolic analysis successful (0.242581 sec).

```
circuit_2.symbolic_node_voltages
```

```
ans =
```

$$\begin{pmatrix} v_1 = V_1 \\ v_2 = \frac{R_2 V_1 (Ga R_1 + 1)}{R_1 + R_2 + Ga R_1 R_2} \\ v_3 = -\frac{Ga R_1 R_3 V_1}{R_1 + R_2 + Ga R_1 R_2} \end{pmatrix}$$

Current-Controlled-Voltage-Sources

```
circuit_3 = Circuit('circuits/H_src.txt');
circuit_3.list
```

```
ans =
'V1 1 0 DC 12
R1 1 2 1000
R2 2 0 2000
R3 3 0 3000
Ha 3 2 V1 100
'
```

```
ELAB.analyze(circuit_3)
```

Symbolic analysis successful (0.303658 sec).

```
circuit_3.symbolic_node_voltages
```

```
ans =
```

$$\begin{pmatrix} v_1 = V_1 \\ v_2 = \frac{R_2 V_1 (Ha + R_3)}{R_1 R_2 + R_1 R_3 + R_2 R_3 + Ha R_2} \\ v_3 = -\frac{R_3 V_1 (Ha - R_2)}{R_1 R_2 + R_1 R_3 + R_2 R_3 + Ha R_2} \end{pmatrix}$$

Current-Controlled-Current-Sources

```
circuit_4 = Circuit('circuits/F_src.txt');
circuit_4.list
```

```
ans =
'V1 1 0 DC 12
R1 1 2 2000
R2 2 0 4000
R3 3 0 8000
Fa 3 2 V1 f
'
```

```
ELAB.analyze(circuit_4)
```

Symbolic analysis successful (0.260203 sec).

```
circuit_4.symbolic_node_voltages
```

```
ans =
```

$$\begin{pmatrix} v_1 = V_1 \\ v_2 = -\frac{R_2 V_1 (\text{Fa} - 1)}{R_1 + R_2 - \text{Fa} R_2} \\ v_3 = \frac{\text{Fa} R_3 V_1}{R_1 + R_2 - \text{Fa} R_2} \end{pmatrix}$$