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 (0.443582 sec).
```

```
circuit_1.symbolic_node_voltages
```

```
ans =
```

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

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 (0.311327 sec).
```

```
circuit_2.symbolic_node_voltages
```

```
ans =
```

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

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 (0.381723 sec).
```

```
circuit_3.symbolic_node_voltages
```

```
ans =
```

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

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 (0.300013 sec).
```

```
circuit_4.symbolic_node_voltages
```

```
ans =
```

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