
Cirsym-online
Online service for symbolic circuit function calculation

Getting started

Cirsym is an online tool for calculation of symbolic circuit functions of linear analog circuits. The input data is a slightly modified Spice-compatible netlist, which can be entered online or loaded as a simple txt-file without extension. Note that only digits can be used as name of txt file. The features of compatible netlist are discussed in the next pages.

The current version of Cirsym-online provides calculation of network function of Single-Input-Single-Output circuit only.

There are several settings which can change the determinant generation process and output results style.

Netlist: The beginning and the end

The first string in netlist is a name of equivalent circuit:

Test circuit

The frequency of input signal must be written in the second string as shown below (for example, f=1000 Hz):

.AC LOG 5 1000

Cirsym-online provides calculation of several circuit at once.

The end of netlist of each circuit is notified by string:

.end

The end of cir-file is notified by string:

.total

There are three objects can be described in the netlist: one-port element, two-port element and multi-ports subcircuit.

Netlist: Input sources

One-port elements is describes by following string:

Xname y1 y2 z

where *X* is an element's symbol, *name* is an element's name which can be integer, lowercase symbol or combination of both. The circuit nodes are numbered by integers y1 and y2 in second and third columns correspondingly. The parameter value z is presented in fourth column.

The following strings can be used to identify the input sources:

Ename y1 y2 z

Jname y1 y2 z

where *E* is a symbol of EMF which value in volts, *J* is a current source which value in amperes.

Netlist: Passive one-ports

The passive impedance and admittance elements are identified by uppercase and lowercase characters correspondingly: *R*, *L*, *C* and *g*, *l*, *c*:

Rname y1 y2 z
rname y1 y2 z
gname y1 y2 z
Cname y1 y2 z
cname y1 y2 z
Lname y1 y2 z
lname y1 y2 z

The resistance value in ohms, the admittance value in siemens, the capacitance value in farads, the inductance value in henries.

Netlist: Controlling sources

Controlled source is identified by following string:

Xname y1 y2 y3 y4 z

where *X* is an element's symbol, *name* is an element's name which can be integer. The integers y1 and y2 represent controlled terminals (source), y3 and y4 represent controlling terminals.

Four symbols can be used: K is control parameter of voltage controlled voltage source, G is control parameter of voltage controlled current sources, H is control parameter of current controlled voltage source and B is control parameter of current controlled current source.

The parameter value z is presented in sixth column.

Netlist: Pathological elements

The nullor (norator-nullator pair) is identified by following string:

Nname y1 y2 y3 y4

where *name* is an nullor's name which can be integer. The integers y1 and y2 represent controlled terminals (norator), y3 and y4 represent controlling terminals (nullator).

The voltage mirror – current mirror (VM-CM) pair is identified by following string:

Mname y1 y2 y3 y4

where *name* is an element's name which can be integer. The integers y1 and y2 represent controlled terminals (CM), y3 and y4 represent controlling terminals (VM).

Netlist: Pathological elements

The CM-nullator pair is identified by following string:

Tname y1 y2 y3 y4

where *name* is an element's name which can be integer. The integers y1 and y2 represent controlled terminals of CM, y3 and y4 represent controlling terminals of nullator.

The norator-VM pair is identified by following string:

Qname y1 y2 y3 y4

where *name* is an element's name which can be integer. The integers y1 and y2 represent controlled terminals of norator, y3 and y4 represent controlling terminals of VM.

Netlist: Circuit output

The output voltage is identified by following string:

Uname y1 y2

where *name* is an voltage's name which can be integer. The integers y1 and y2 represent terminals.

The output current is identified by following string:

Iname y1 y2

where *name* is an current's name which can be integer. The integers y1 and y2 represent terminals.

If the output function is not specified Cirsym-onlide provides calculation of circuit determinant.

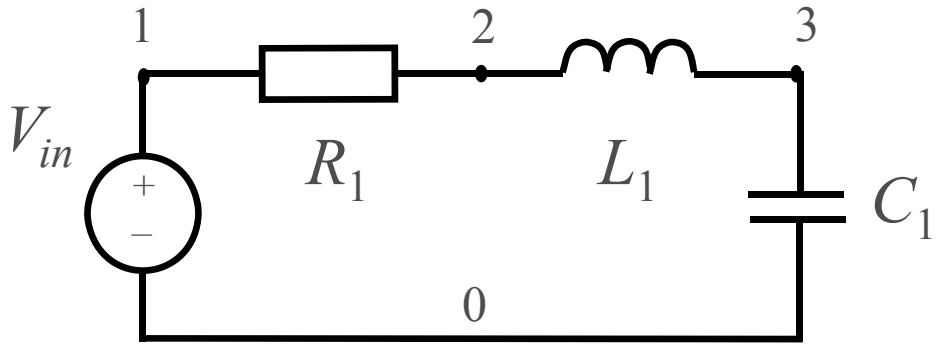
The calculated symbolic expression will be shown on the screen and can be downloaded as text file thru the temporary link.

Parameters of bisections

The user can set the parameters of bisections in the options. The number of nodes available for bisection is limited to five in the current version of Cirsym-online. There are two parameters for bisection. The first is a minimal number of nodes to start the bisection. The second parameter which vary from 0.1 to 0.45 defines the mode of optimal circuit partition. In the case of 0.45, the program will perform all possible kinds of circuit bisection.

Example 1

Circuit:

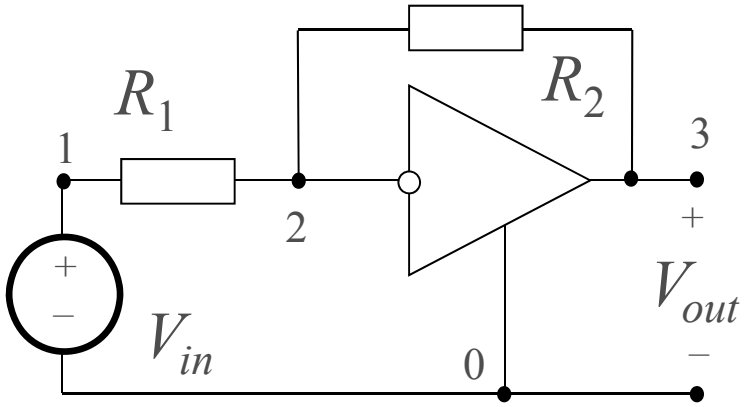


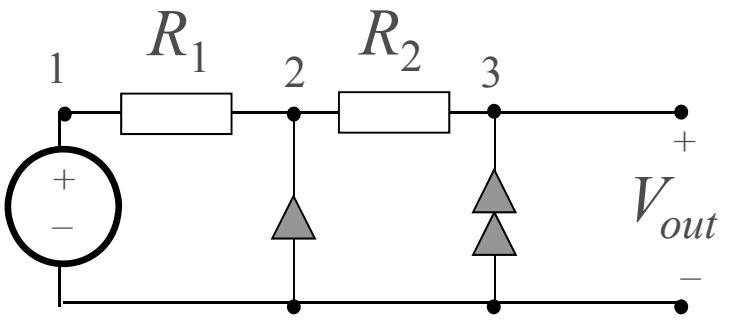
Netlist:

```
Test circuit
.AC LOG 5 1000
 E1  0  1  z
 R1  1  2  z
 L1  2  3  z
 c1   3  0  z
 .end
 .total
```

Example 2

Circuit:



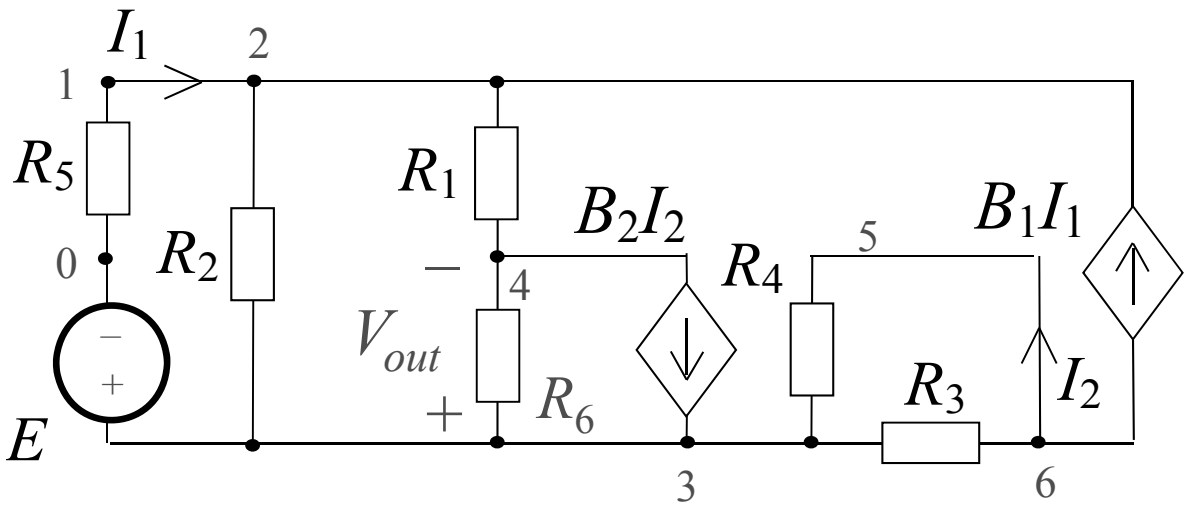


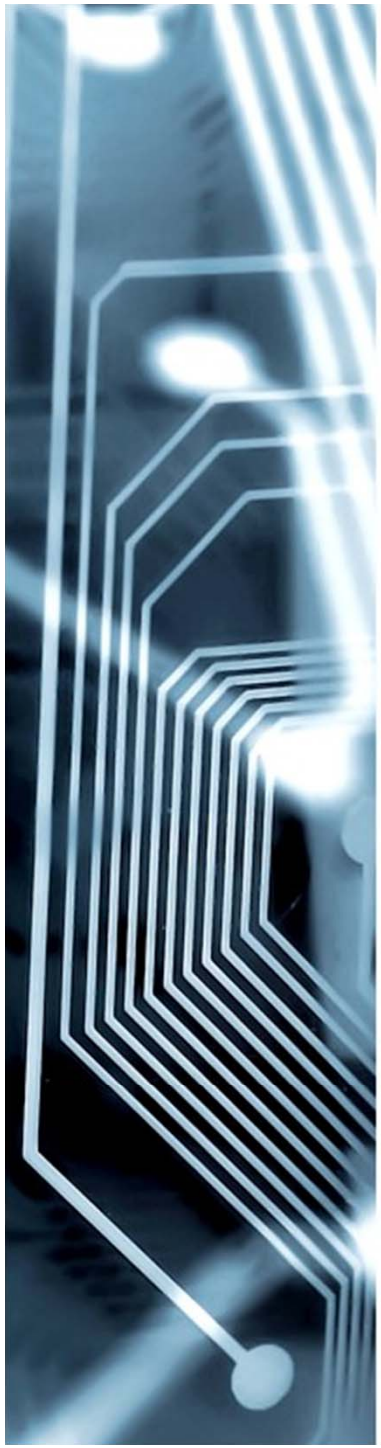
Netlist:

```
Test circuit
.AC LOG 5 1000
E1  0  1  z
R1  1  2  z
R2  2  3  z
N1  0  3  0  2  z
U1  3  0
.end
.total
```

Example 3

Circuit:





Example 3

Netlist:

```
Test circuit
.AC LOG 5 1000
E1  0  3  z
R1  2  4  z
R2  2  3  z
R3  3  6  z
R4  3  5  z
R5  0  1  z
R6  3  4  z
B1I1  6  2  1  2  z
B2I2  4  3  6  5  z
U1  3  4
.end
.total
```