Symbolic MNA Matrix Analyzer User Manual

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Installation

The source code is hosted by Google Code with GNU GPL v3 license.

Download

First check out the latest source code with Subversion:

$ svn checkout http://qt-practise.googlecode.com/svn/trunk/MNA MNA

You need at least the following to build the executable: the GNU tools **flex**, **bison** and GNU **make**, **ar**.

To take full advantage of all the features LaTeX packages are needed. Make sure **pdflatex**, **latex2html**, **firefox** and **acroread** are present in the search path of your environment.

Compiling on Linux

Compilation on Linux is now done by performing the following 2 steps:

1. Enter the top directory
   $ cd MNA
2. Compile the program by running **make** (-j*N* will speed up the compilation, where *N* is the number of processes created by **make**):
   $ make -j4

The program should compile without problems and the binary (**mna-Linux-release)** and script (**mna.sh**) should be available in the top directory of the distribution.

Compiling on Windows

Compiling from source on Windows (Cygwin or MinGW) is the same as compiling on Linux.

Name

mna.sh – print the MNA Matrix of a flat linear circuit in PDF format

Synopsis

mna.sh [**-i]** *input_netlist* [**-o** *output_prefix*] [**-f** html|pdf]

The output files are

1. *output_prefix*.tex : a text file, LaTeX format MNA matrix.
2. *output_prefix*.pdf: produced by **pdflatex** *output_prefix*.tex if **-f** pdf.
3. *output_prefix/…*: produced by latex2html output_prefix if **-f** html.

If no **-o** option is given, the *output_prefix* will be “mna” by default.

Description

mna.sh is a BASH wrapper script of the program. It accepts a flat (i.e. no subckts) HSPICE-like netlist as the input file.

10 supported linear element types are listed in Table 1.

Table 1 All supported element types

Element Type	Syntax
Resistor	**R**xxx n+ n-
Capacitor	**C**xxx n+ n-
Inductor	**L**xxx n+ n-
Independent DC Voltage Source	**V**xxx n+ n-
Independent DC Current Source	**I**xxx n+ n-
Voltage-Controlled Voltage Source (VCVS)	**E**xxx n+ n- in+ in-
Current-Controlled Current Source (CCCS)	**F**xxx n+ n- **V**xxx
Voltage-Controlled Current Source (VCCS)	**G**xxx n+ n- in+ in-
Current-Controlled Voltage Source (CCVS)	**H**xxx n+ n- **V**xxx
Ideal Operational Amplifier (VCVS, OPAMP)	**E**xxx n+ n- **OPAMP** in+ in-

Note:

1. The 3rd argument, **V**xxx, of CCCS and CCVS must be an independent voltage source name.
2. Pin **n-** of an ideal operational amplifier is ignored because it must be the GROUND. However, the pin must be given in order to match the HSPICE syntax as much as possible.

HSPICE commands and other devices are skipped as well as comments.

The first line of *input_netlist* is not a comment.

Running the program

To view the symbolic MNA matrix of a circuit:

$ **mna.sh** <netlist_file>

A series of demo cases are given under the **test** directory. You can try each of them.

For example,

$ **mna.sh** test/rv.sp

The default output directory is where the **mna.sh** is started. Here the output files are using the default names: mna.tex and mna.pdf. You can see the MNA matrix in **acroread** window as shown in Figure 1.

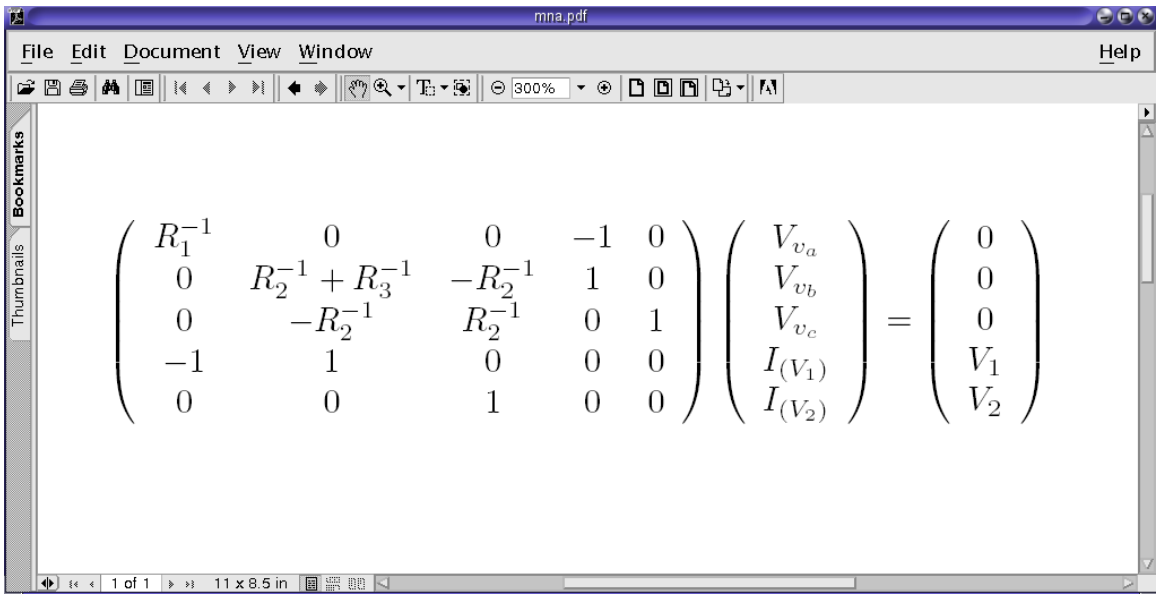

Figure 1 The symbolic MNA matrix of test/rv.sp in Linux acroread window

Another example with an ideal opamp, a capacitor, etc. is shown in Figure 2.

$ **mna.sh** test/filter01.sp

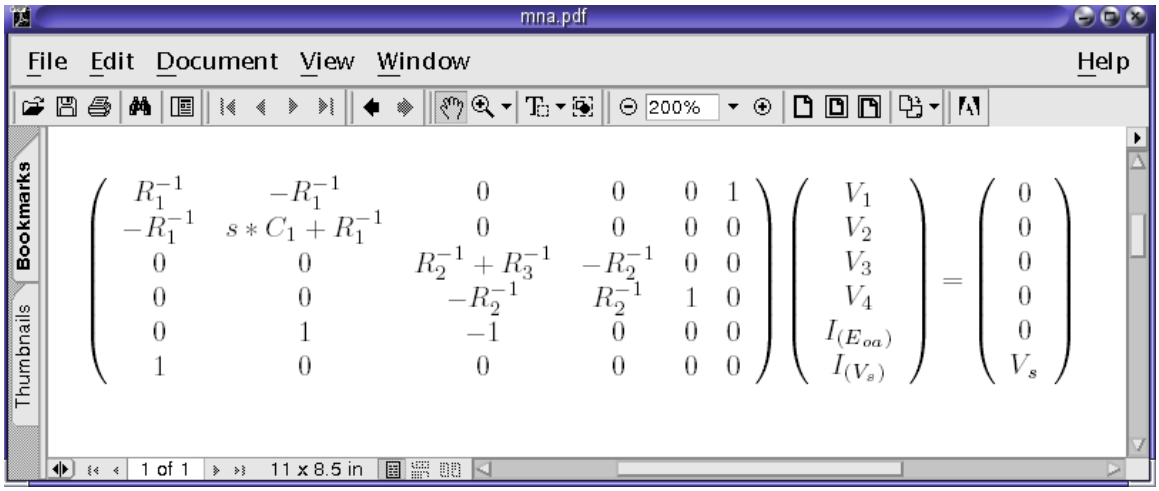

Figure 2 The symbolic MNA matrix of test/filter01.sp in Linux acroread window