

“ElabMat11” VTB Model

Author: Antonello Monti

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Model name: ElabMat11

DLL name: elabmat11.vtm

Version number: 1.0

Report errors or changes to: monti@engr.sc.edu

Installation of Matlab Models

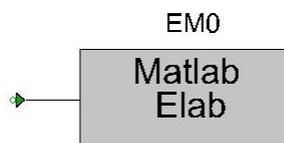
In order to install and use the Matlab interface models there is a set of instructions that must be followed. These instructions include the setup to use Matlab remotely from VTB. Once these steps are accomplished then adding more Matlab interface models is simple and does not require repeating these steps.

- Step 1. Copy the following DLL's from the Matlab installation folder on the host computer into the installation folder of the Virtual Test Bed. The DLL's must be copied into the directory with the VTB Schematic Editor executables. The DLL's will be located in the bin folder of the Matlab installation path.

libeng.dll
libmat.dll
libmi.dll
libmx.dll
libut.dll
libmatlmbx.dll

- Step 2. Start Matlab and set the same directory as used in step #1 as a permanent path for Matlab.

Pictorial Representation of Model



Brief Description of Model

VTB-Matlab interface uses and requires a registered copy of Matlab to be loaded onto the host computer. The input and output ports are modeled as signal ports. The VTB-Matlab interface requires a Matlab .m file to be located in an active or permanent path of Matlab. The voltage at the input of the VTB model is sent to the Matlab function as input parameter, together with a flag to identify init phase. The user can freely specify the sampling time of the Matlab function.

Model Validity Range and Limitations

The VTB-Matlab models are restricted to the necessity of certain Matlab DLLs being located in the executable directory of the schematic editor. A Matlab .m file with the correct number of inputs is required to be in a working directory of Matlab.

The validity range of the VTB-Matlab models depends on the meeting of requirements and the validity of the Matlab file being interfaced into.

List of Model Pins with Connectivity Information

Pin Designation	Description
InputPort	Signal Input Port

List of Parameters and Output Variables

This is a complete list of all parameters of the model. All models use SI units.

Parameter Name	Description	Default Value	Units
FileName	Name of the m file to interface (the extension should not be included)	Ela11	N/A
PathName	Name of the path where the m file is located	C:\	N/A
SamplingTime	Sampling time for the Matlab function	1e-3	s
SamplingToll	Tolerance on the sampling instant	1e-6	s

This is a list of viewable variables.

Variable Name	Description	Units
CurrentSample	Last value sampled by VTB	V

Assumptions in Model Derivation

The Matlab function is supposed to have two input parameters:

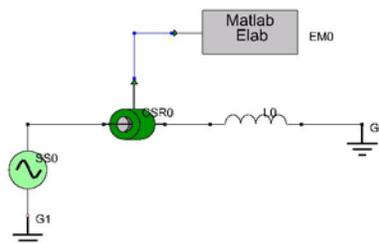
- the value that needs to be processed
- a flag to indicate the init function. This can be used to initialize any global variable present in the function

Mathematical Description of Model

This block does not perform any mathematical elaboration. It only applies variable time step features of the VTB solver to guarantee the correct execution of the sampling process

Example of Model Use

Let us consider the very simple example of the following figure:



The current of this system is sampled and sent to a Matlab function for post-processing
The list of the applied Matlab file is reported in the following:

```

function ela11(u,opz)

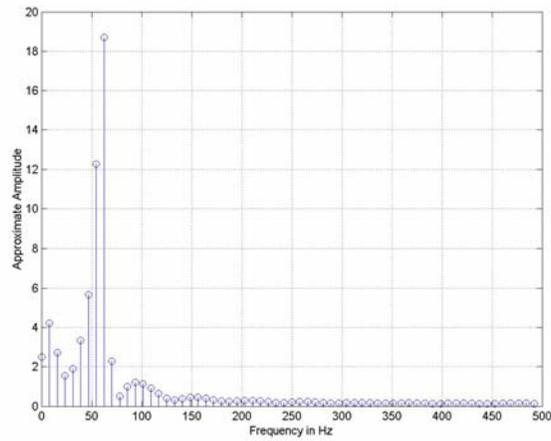
global count;
global val;

maxcount = 128;

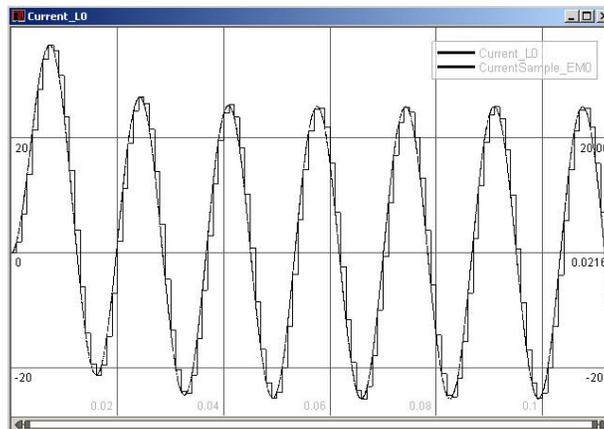
if opz == 0
    count = 0
else
    count = count+1;
    val(count) = u;
    if count == maxcount
        simplespec(val,1000);
        count = 0;
    end
end
end

```

This function is designed to perform an FFT of the signal when 128 points are available. The plot is performed by Matlab by using another user defined function called simplespec.



The plot performed by Matlab in a separate window



The VTB current and the sampled values

References

- [1] R. Dougal, T. Lovett, A. Monti, E. Santi, "A Multilanguage Environment For Interactive Simulation And Development Of Controls For Power Electronics", IEEE PESC01, Vancouver (Canada)