

Lab# 00

An insight to the basics of MATLAB and Simulink Library

AIM:

To learn basics of MATLAB and Simulink Library.

1. Introduction to MATLAB:

MATLAB is a widely used numerical computation package. It serves both as a simple calculator and as a sophisticated tool for making long complicated calculations and plot graphs of different functions depending upon requirement. Models of dynamic systems can be built easily using SIMULINK. Some Benefits of MATLAB are:

- Simple to use
- Fast computations are possible
- Wide working range
- Solution of matrix of any order
- Desired operations are performed in matrices
- Different Programming languages can be used
- Simulation is possible

To start using MATLAB/SIMULINK, open editor to create an m-file or an .mdl Simulink model in Simulink window. Always save using file names without breaks in words. Some very important functions performed by MATLAB are:

- Matrix computations
- Vector Analysis
- Differential Equations computations
- Integration
- Computer language programming
- Simulation
- 2-D & 3-D Plotting

Some Basics:

- To add a comment the following symbol is used “%”.
- Help is provided by typing “help” or if you know the topic then “help function_name”.
- If you don’t know the exact name of the topic or command you are looking for, type “look for keyword”.
- These dots “...” are used to continue a statement to next line (row).
- MATLAB is case sensitive.

2. Introduction to Simulink:

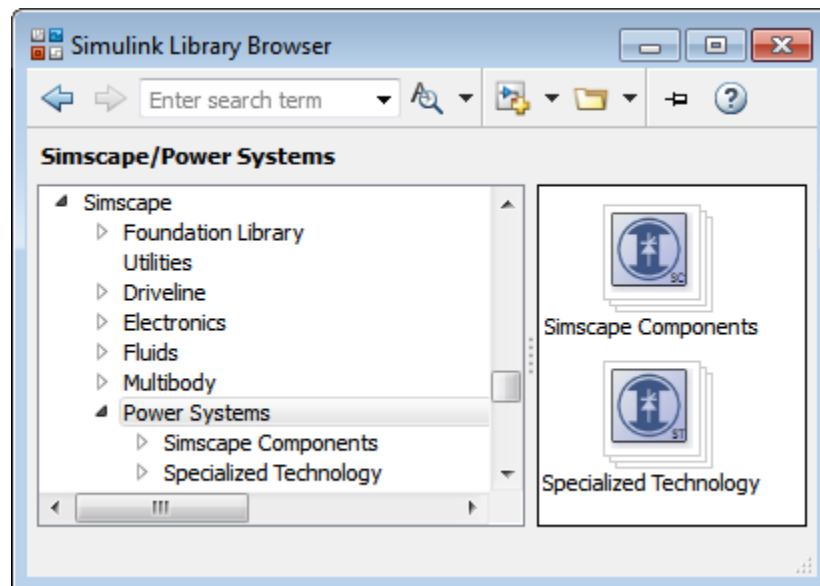
Simulink® allows you to model algorithms and physical systems using block diagrams. You can model both linear and nonlinear systems.

Simulink provides a comprehensive library of predefined blocks. You build models by dragging blocks from this library into your model, and then connecting the blocks with signal lines to establish mathematical relationships between system components. Graphical formatting tools help you control the appearance of your model as you build it.

Using the Simulink Library Browser to Access the Block Libraries

You can access SimPowerSystems libraries through the Simulink Library Browser. To display the Library Browser, click the **Simulink Library** button in the MATLAB tool strip, or click the **Library Browser** button in the Simulink model window.

Alternatively, you can type Simulink in the MATLAB Command Window. Expand the **Simscape** entry in the contents tree, and then expand the **SimPowerSystems** entry.



SimPowerSystems:

Model and simulate electrical power systems.

Simscape Components:

Model electrical power systems using Simscape components.

- Connections
Grounds, neutral ports, phase splitters, multiplexers
- Machines
Asynchronous and synchronous machines, motors, machine measurements.

- Passive Devices
Transformers, RLC branches and loads, transmission lines.
- Semiconductors
Converters, rectifiers, diodes, thyristors.
- Sensors
Line and phase voltage sensors, current sensors.
- Sources
Three-phase voltage and current sources.
- Switches and Breakers
Three-phase switches and circuit breakers, single-phase switches and circuit breakers.
- Simulation and Analysis
Performance improvements, analysis tools and techniques.


Build the Model

1. Open the Simulink Library Browser.
2. Select **File > New > Model**.
3. Drag those blocks from the library into your model which you need

Simulate and Analyze

When you built a simple SimPowerSystems™ Simscape™ Components model. This procedure shows you how to run the simulation and plot the results.

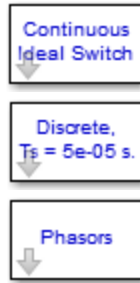
Steps:

1. Simulate the model.
2. View the phase currents and voltages. Double-click the Scope block.
3. Click the Auto scale button  to scale the scope axes to the data.

Using the Powergui Block to Simulate SimPowerSystems Models

The Powergui block is necessary for simulation of any Simulink model containing Simpowersystem blocks. Powergui block is shown below.





The Powergui block allows you to choose one of these methods to solve your circuit:

- Continuous, which uses a variable-step solver from Simulink®
- Ideal switching continuous
- Discretization of the electrical system for a solution at fixed time steps
- Phasor solution

When using one Powergui block in a model:

- Place the Powergui block in the top level diagram for optimal performance.
- Make sure the block uses the name Powergui.
- You can use multiple Powergui blocks in a system that contains two or more independent electrical circuits that you want to simulate with different Powergui solvers. For example, System simulates the upper electrical circuit in discrete mode and the bottom circuit in continuous mode. The purpose is to compare simulation performance of the two methods.

Lab Task:

1. Write the names of component used in Simscape.

2. Explain some component of Simscape.

Obtained Marks:

Remarks: