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System Modeling & Control[1]

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[1] Available @ https://github.com/a-mhamdi/isetbz/

Honor Code

(THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL: Department of Physics and Astronomy[a])

[a]See: `http://physics.unc.edu/undergraduate-program/labs/general-info/`

During this course, you will be working with one or more partners with whom you may discuss any points concerning laboratory work. However, you must write your lab report, in your own words. Lab reports that contain identical language are not acceptable, so do not copy your lab partner's writing.
If there is a problem with your data, include an explanation in your report. Recognition of a mistake and a well-reasoned explanation is more important than having high-quality data, and will be rewarded accordingly by your instructor. A lab report containing data that is inconsistent with the original data sheet will be considered a violation of the Honor Code.
Falsification of data or plagiarism of a report will result in prosecution of the offender(s) under the University Honor Code.
On your first lab report you must write out the entire honor pledge:

"The work presented in this report is my own, and the data was obtained by my lab partner and me during the lab period."

On future reports, you may simply write "*Laboratory Honor Pledge*" and sign your name.

What is Simulink?

Simulink®[a] is a block diagram environment for multidomain simulation and Model-Based Design. It supports system-level design, simulation, automatic code generation, continuous test and verification of embedded systems[b].

[a] Simulink is a registered trademark of The MathWorks, Inc.

[b] `http://www.mathworks.com/products/simulink/`

Key Features[a]

[a] `http://www.mathworks.com/products/simulink/description1.html`

- Graphical editor for building and managing hierarchical block diagrams ;
- Libraries of predefined blocks for modeling continuous-time and discrete-time systems ;
- Simulation engine with fixed-step and variable-step ODE solvers ;
- Scopes and data displays for viewing simulation results ;
- Project and data management tools for managing model files and data
- Model analysis tools for refining model architecture and increasing simulation speed, etc.
- MATLAB Function block for importing MATLAB algorithms into models
- Legacy Code Tool for importing *C* and C^{++} code into models

Click here to subscribe to Matlab Channel on YouTube for further tutorials.

Outline

Signals & Systems (1/2)

Lab. #1

Consider the following equation:

$$y^{(2)}(t) + 3y^{(1)}(t) + 0.3y(t) = 5\sqrt{2}sin(2 \times \pi \times t + 35) + 0.1$$

1. Draw the corresponding diagram using `Simulink`.
2. Make a subsystem.
3. Mask the subsystem previously created.

Signals & Systems (2/2)

Lab. #2

Consider the following equation, where τ denotes the delay and is equal to $1.25\ s$:

$$\begin{cases} y_1^{(5)}(t) + y_2^{(4)}(t) + 3y_1^{(2)}(t) - 1.3y_1(t) &= 3.5\sin(46\pi t + 5) + \delta(t-\tau) \\ y_2^{(3)}(t) + 2.65(y_1^{(2)}(t) - y_2^{(2)}(t)) + y_2(t) &= 5\cos(4\pi t) - 2\Gamma(t) \end{cases}$$

1. Draw the corresponding diagram using `Simulink`.
2. Make a subsystem. (Let only the input and the two outputs $y_1(t), y_2(t)$ be accessible).
3. Mask the subsystem previously created.