Software Workshop for Engineers: Simulink

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System Control and System Design Engineering

Institut Supérieur des Études Technologiques de Bizerte

Outlines

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This document is a draft version, intended for engineers who want to start with Simulink. We took System Control as a field of application. Some examples will be discussed in this document. Reader is invited to test them on his machine. Just, follow steps detailed in class.

The URL shown in footnotes are indicatives. They have been visited in 2013. We do not guarantee their validities and we are not responsible on updates mis-leaded by some websites.

Purposes

Student has to be able to:

- build and simulate a model with Simulink ;
- perform physical cabling within Simscape ;
- make 3D animations on Simulink.

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[a] Simulink is a registered trademark of The MathWorks, Inc.
[b] http://www.mathworks.com/products/simulink/

Key Features[a]

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- 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 ;
- Model analysis tools for refining model architecture and increasing simulation speed, etc.

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Lab. 1

Consider the following equation:

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

a. Draw the corresponding diagram using simulink.
b. Make a subsystem.
c. Mask the subsystem previously created.

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Lab. 2

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

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

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Lab. 3[a]

[a] http://www.sciences.univ-nantes.fr/sites/genevieve_tulloue/equadiff/equadiff.html

Lab. 4[a]

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Lab. 5[a]

[a] http://www.sciences.univ-nantes.fr/sites/genevieve_tulloue/Meca/Oscillateurs/ressort.html

RC Circuit (1/2)

Lab. 6[a]

[a] http://www.sciences.univ-nantes.fr/sites/genevieve_tulloue/Elec/Transitoire/chargeRC_TS.html

RC Circuit (2/2)

Lab. 7[a]

[a] http://www.sciences.univ-nantes.fr/sites/genevieve_tulloue/Elec/Filtres/filtre.html

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Lab. 8[a]

[a] http://www.sciences.univ-nantes.fr/sites/genevieve_tulloue/Meca/Oscillateurs/suspension.html