MATLAB TOUR 2017

Modelización, simulación y pruebas en Simulink

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Why Test?

- Does the subsystem/system meet the design requirements?
- The model worked last week… does it still?
- The model / algorithm has been modified… is it still working ok?
- Do these legacy models / libraries work in this new application?
- Does it work real-time, integrated with hardware?
- Does running the generated embedded code match running the model?
Testing to date…

- Create harness models
  - to exercise model references or subsystems

- Write MATLAB code
  - to run the tests

- Write more MATLAB code
  - to verify the test results

- Write some more MATLAB code / using Report Generator
  - to report on the test results

- Creating custom GUIs to manage running of tests
## Simulink Test Overview

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<td>• Synchronized, simulatable test environment</td>
<td>• Inputs and assessments based on logical, temporal conditions</td>
<td>• Author, execute, manage test cases</td>
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<td>• Inputs and assessments based on logical, temporal conditions</td>
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### Component under test

#### Main Model

- Double-click to open the GUI and select an input channel.

- **Test Harness**

- **Component under test**
Creating Test Harnesses
But what if…

- The component is in a library

- The reset should be relative to the time constant of the filter

- We want to verify a requirement that:
  
  \[
  \text{filter output shall equal } \text{resetValue when reset is true}
  \]
Release Notes – Test Harnesses

- Test Harnesses for Libraries R2016a
- External Test Harnesses R2016a
- External Test Harnesses with Requirements Linking R2016b
- Move/Clone test harnesses R2017a
Test Sequence / Test Assessment block

Test Sequence
Release Notes – Test Sequence

- description field R2016a
- tab complete & syntax highlighting R2016a
- port reordering R2016a
- support messages R2016a
- “verify” statements R2016a
- proof objective support for verify statements R2017a
Test Manager
Simulation Testing

- Requirement Based (Simulation) Testing
  - Does my design comply with my requirements?

- Equivalence Testing
  - Do these models match? Does generated code match this model?

- Regression (Baseline) Testing
  - Have I broken anything with the change I’ve just made?
Create a baseline test
Create a test for multiple parameter values and verify response against a custom criteria
Test Iterations

- Define by table or script
- Combine with Parallel Computing Toolbox &/or fast restart as appropriate
- Run via UI or programmatically
- Easy to re-run selected iterations
Reporting
Release Notes – Test Manager

- Parallel Computing Toolbox integration R2016a
- Simulink Real-Time integration R2016a
- Custom test criteria R2016b
- MATLAB Unit Test integration R2016b
- Simulink Design Verifier integration R2017a
- Time Tolerance R2017a
Extend requirements-based tests to achieve full coverage

(Simulink Test + Simulink Design Verifier)
A file is modified;

What test(s) do I need to run?

(Simulink Test  + Simulink Projects)
Thermal requirement test

Baseline Test

**DESCRIPTION**

**SYSTEM UNDER TEST**

Model: motorPlant

**PARAMETER OVERIDES**

**CALLBACKS**

**INPUTS**

**OUTPUTS**

**CONFIGURATION SETTINGS OVERIDES**
Simulink Test... makes testing easier...

- **Flexible**
  - Ease authoring different types of test
  - Desktop or real-time

- **Scalable**
  - Hierarchical
  - Integration with Parallel Computing Toolbox

- **Simple & Efficient**
  - Less time writing infrastructure code
  - Integration with other V & V tools
  - Automated reporting