Model Predictive Control Toolbox Release Notes

Note No significant new features have been introduced for Version 2.2 of the Model Predictive Control Toolbox. The product is essentially unchanged from Version 2.1.

If you are upgrading from a version earlier than Version 2.1, you should also see these sections:

- "Model Predictive Control Toolbox 2.1 Release Notes" on page 1-1
- "Model Predictive Control Toolbox 2.0 Release Notes" on page 2-1

Printing the Release Notes

If you would like to print the Release Notes, you can link to a PDF version.

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Model Predictive Control Toolbox 2.1 Release Notes

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Major Bug Fixes

The Model Predictive Control Toolbox 2.1 includes several bug fixes made since Version 2.0. You can see a list of the particularly important Version 2.1 bug fixes.

If you are viewing these Release Notes in PDF form, please refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site and use the link provided.

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New Features

This section summarizes the new features and enhancements introduced in the Model Predictive Control Toolbox 2.0.

Object-Oriented Command Syntax

The command syntax has been completely revised, and is similar to that used in the Control System Toolbox. You create an "LTI object" to represent the plant to be controlled, using it and other specifications to create an "MPC object", which represents the controller. You can then analyze controller properties, run simulations, modify the controller design, etc. The following list summarizes the major command features

- Create and modify an MPC Controller Object
- Extract a linear representation of the unconstrained controller as an LTI object (transfer function, state space, or zero-pole-gain)
- Calculate closed-loop steady-state gains for the unconstrained controller
- Determine closed-loop steady-state conditions for given inputs and/or outputs
- Calculate the constrained control action at a specified condition (can be used repeatedly as time evolves in a simulation or experiment)
- Simulate closed-loop constrained response for a linear plant and arbitrary changes in the reference signals (setpoints), disturbances, and noise
- Specify disturbance characteristics to improve regulation while maintaining good response to reference signal changes (2-DOF design)

MPC Block for Simulink

The completely revised MPC block allows you to insert your MPC controller object into a Simulink block diagram. You can use multiple MPC blocks within a single Simulink model if you wish. In any case, the MPC block makes it easy to evaluate controller performance with a nonlinear plant.

MPC Tools Designer

MPC Tools is a new graphical environment that allows you to design and test an MPC controller object without learning the command syntax. It is tightly

integrated with the MPC block for Simulink, making it easy to run either a linear or nonlinear simulation.

Integration with Other MATLAB Toolboxes

MPC Toolbox uses the same LTI model representation found in the Control Systems Toolbox, the System Identification Toolbox, etc. Examples of ways in which you can exploit toolbox compatibility include

- Import raw dynamic response data to the System Identification Toolbox, determine an appropriate LTI plant model, and export it to the MPC Toolbox for controller design
- Extract an LTI representation of an MPC controller for analysis in the Control Systems Toolbox or the Robust Control Toolbox

Integration with Control and Estimation Tools Manager

The MPC Graphical Design Tool is integrated with other control and estimation projects within the Control and Estimation Tools Manager environment. In general, this allows you to group together control-related applications associated with the same Simulink model and to share infrastructure. Specifically, the ability to combine the functionality of the MPC Toolbox and the Simulink Control Design Toolbox allows in-situ MPC design in Simulink by linearizing a Simulink model as it is connected to an MPC block, with automatic use of the resulting linear model to define the internal MPC plant model.

Demonstrations

The MPC Toolbox includes new demonstrations that highlight all the added features.

Documentation

The documentation has been revised completely.