

# Mathematica 9.0 control systems documentation

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Attempt to document flow of Mathematica 9.0 control systems functions as shown in the documentation center.

# Chapter 1

## Basic Modeling

### 1.1 Core Models

#### 1.1.1 TransferFunctionModel

#### 1.1.2 StateSpaceModel

#### 1.1.3 SystemsModelDimensions

#### 1.1.4 SystemsModelOrder

### 1.2 Models with Time Delays

#### 1.2.1 Modeling and Simulation

##### 1.2.1.1 SystemsModelDelay

##### 1.2.1.2 StateSpaceModel

##### 1.2.1.3 TransferFunctionModel

##### 1.2.1.3.1 Model Connections

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##### 1.2.1.3.2 Model Manipulations

###### 1.2.1.3.2.1 SystemsModelDelete

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- 1.2.2 Models with Algebraic Constraints
- 1.2.3 Model Transformations
- 1.2.4 Sampling and Inverse Sampling
- 1.2.5 Options
- 1.3 Model Connections and Manipulations

- 1.3.1 Model Connections
- 1.3.2 Model Manipulations

## 1.4 Model Simulations

## 1.5 Classical Analysis and Design

RootLocusPlot

- 1.5.1 Frequency Responses
- 1.5.2 PID Tuning
- 1.5.3 Options

## 1.6 Analysis of State-Space Models

- 1.6.1 Controllability and Observability Properties
- 1.6.2 Controllability and Observability Transformations
- 1.6.3 General Transformations

## 1.7 Design using State-Space Models

- 1.7.1 Pole Placement
- 1.7.2 Optimal Control and Estimation
- 1.7.3 Controllers and Estimators

## 1.8 Matrix Equation Solvers