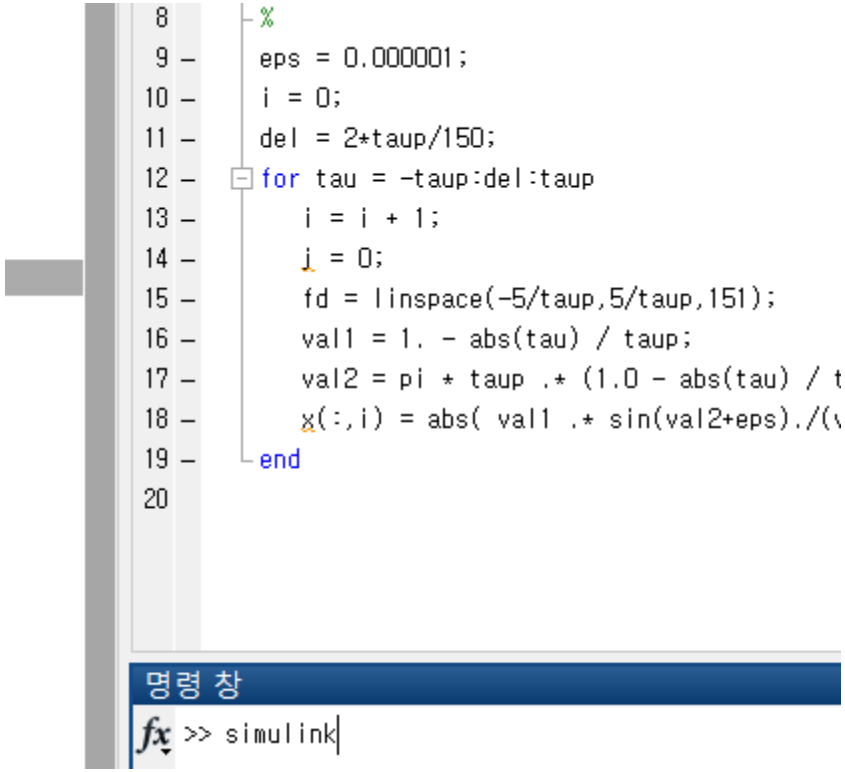
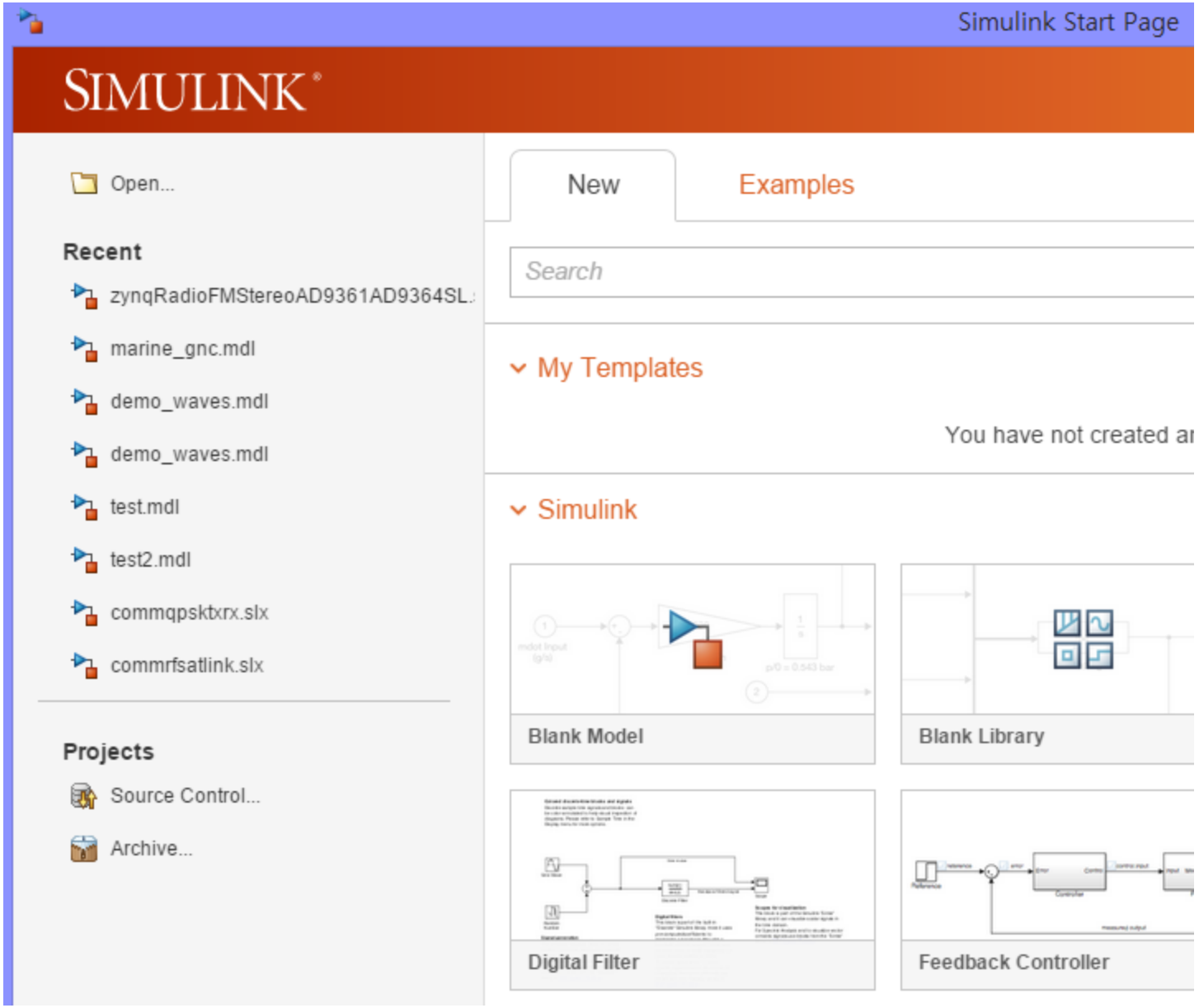
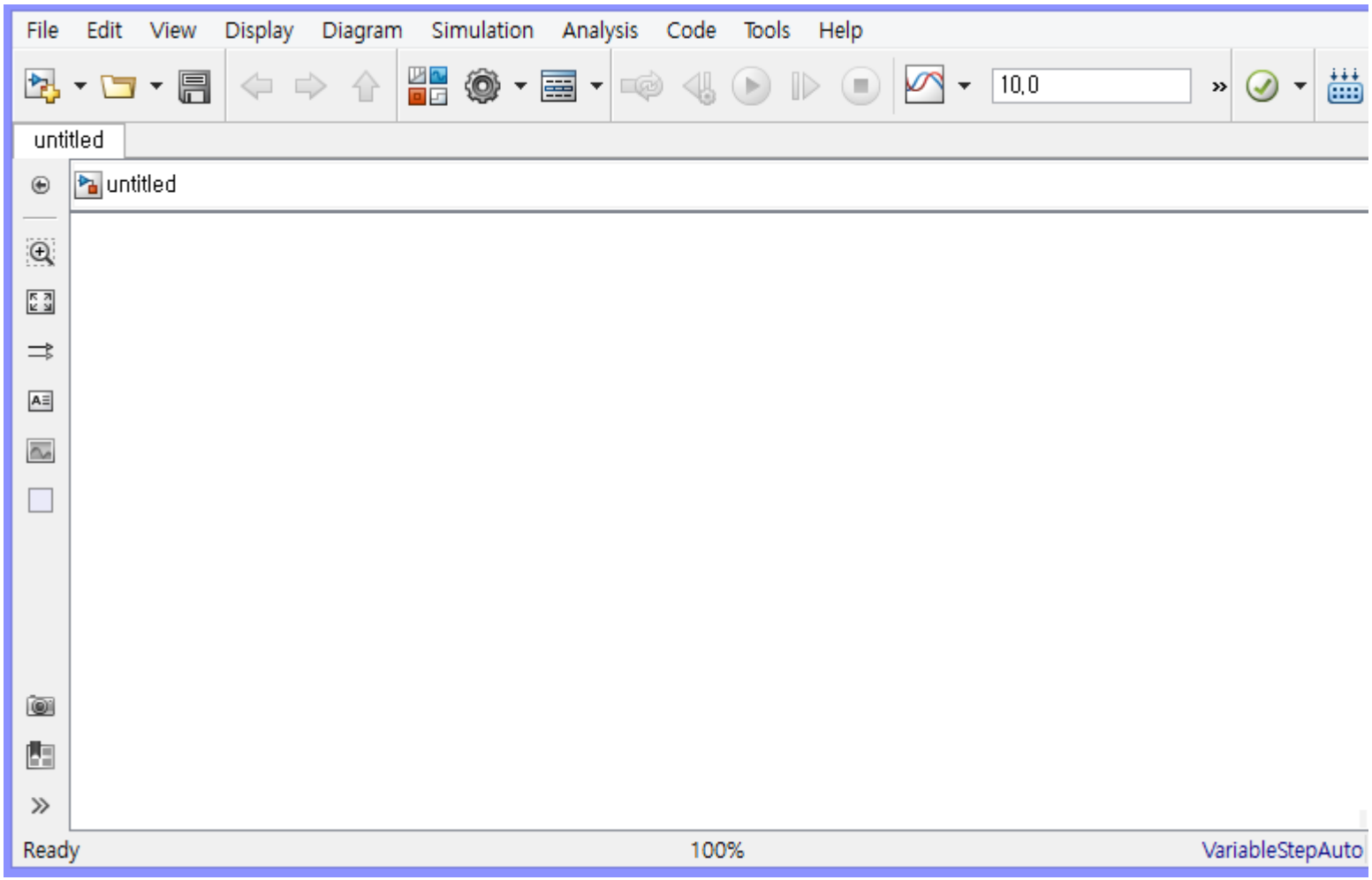
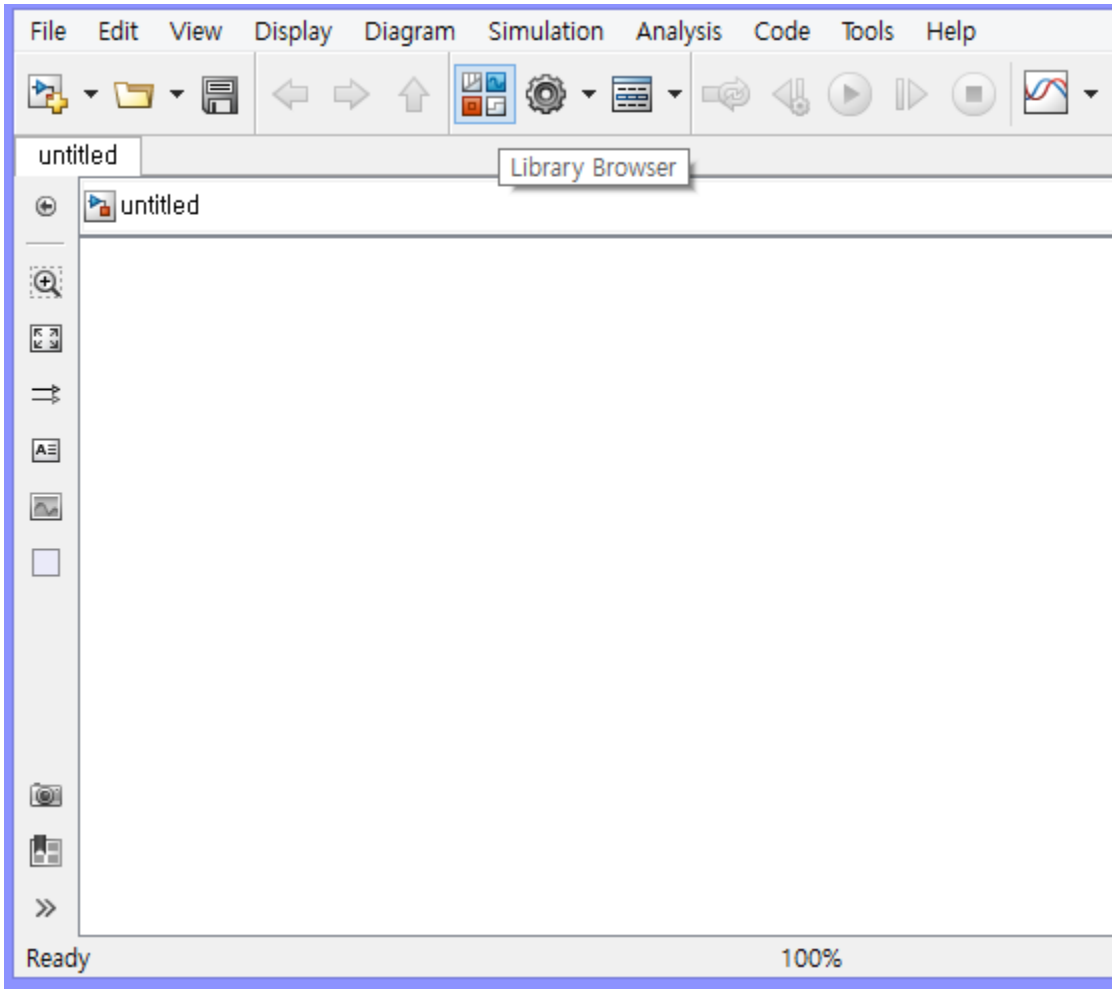
Simulink Control Basics

Innova Lee(이상훈)
gcccompil3r@gmail.com


8 %
9 eps = 0.000001;
10 i = 0;
11 del = 2*taup/150;
12 for tau = -taup:del:taup
13 i = i + 1;
14 j = 0;
15 fd = linspace(-5/taup,5/taup,151);
16 val1 = 1. - abs(tau) / taup;
17 val2 = pi * taup .* (1.0 - abs(tau) / t
18 x(:,i) = abs(val1 .* sin(val2+eps)./(
19 end
20
명령 창
>> simulink


Simulink Start Page
SIMULINK®
Open...
Recent
zynqRadioFMStereoAD9361AD9364SL
marine_gnc.mdl
demo_waves.mdl
demo_waves.mdl
test.mdl
test2.mdl
commqpsktxrx.slx
commrfsatlink.slx
Projects
Source Control...
Archive...
New
Examples
Search
My Templates
You have not created ar
Simulink
Blank Model
Blank Library
Digital Filter
Feedback Controller


File
Edit
View
Display
Diagram
Simulation
Analysis
Code
Tools
Help
10,0
untitled
untitled
Ready
100%
VariableStepAuto


File
Edit
View
Display
Diagram
Simulation
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Code
Tools
Help
untitled
Library Browser
untitled
Ready
100%

Workspace

Aerospace Blockset/Flight Instruments

- Simulink
  - Commonly Used Blocks
  - Continuous
  - Dashboard
  - Discontinuities
  - Discrete
  - Logic and Bit Operations
  - Lookup Tables
  - Math Operations
  - Model Verification
  - Model-Wide Utilities
  - Ports & Subsystems
  - Signal Attributes
  - Signal Routing
  - Sinks
  - Sources
  - User-Defined Functions
  - Additional Math & Discrete
- Aerospace Blockset
  - Actuators
  - Aerodynamics
  - Animation
  - Environment
  - Equations of Motion
  - Flight Parameters
  - Flight Instruments
  - GNC
  - Mass Properties
  - Pilot Models
  - Propulsion
  - Utilities
- Audio System Toolbox
  - Dynamic Range Control
  - Effects
  - Filters
  - Sinks
  - Sources
- Communications System Toolbox
  - Channels
  - Comm Filters
  - Comm Sinks
  - Comm Sources
  - Equalizers
  - Error Detection and Correction

Airspeed Indicator

Altimeter


Artificial Horizon

Climb Rate Indicator

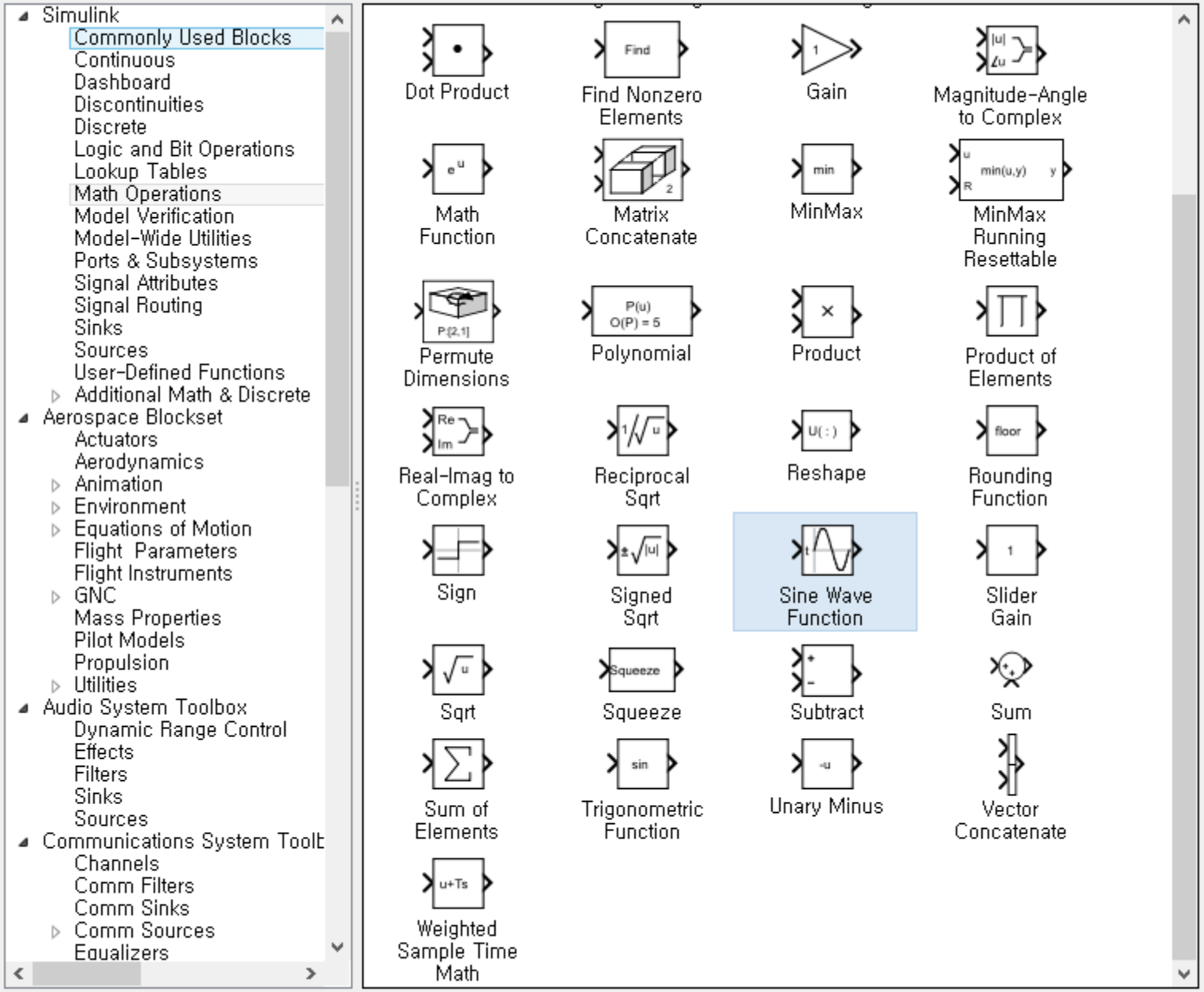
EGT Indicator

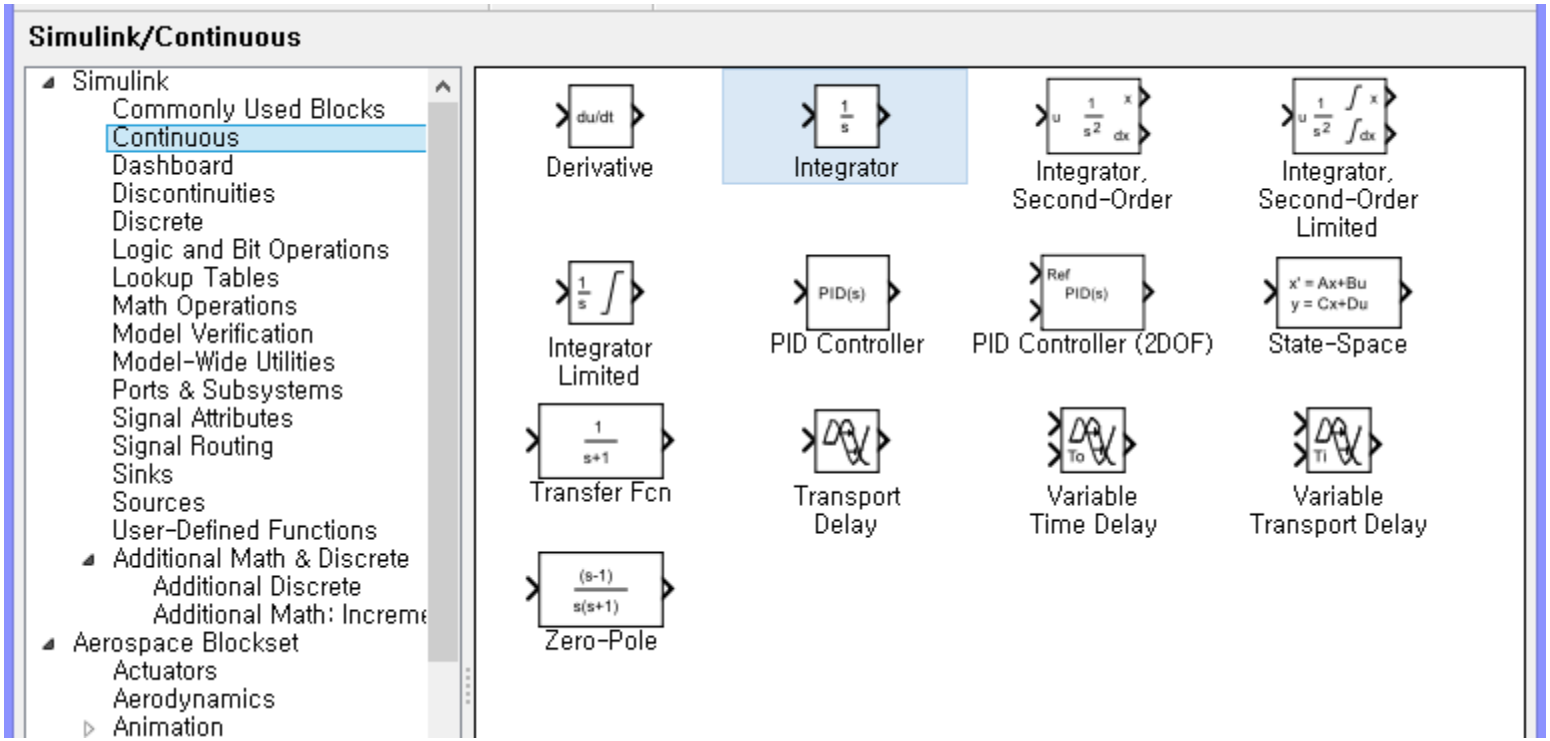

Heading Indicator

RPM Indicator

Turn Coordinator

Simulink/Math Operations




Simulink/Continuous
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
Logic and Bit Operations
Lookup Tables
Math Operations
Model Verification
Model-Wide Utilities
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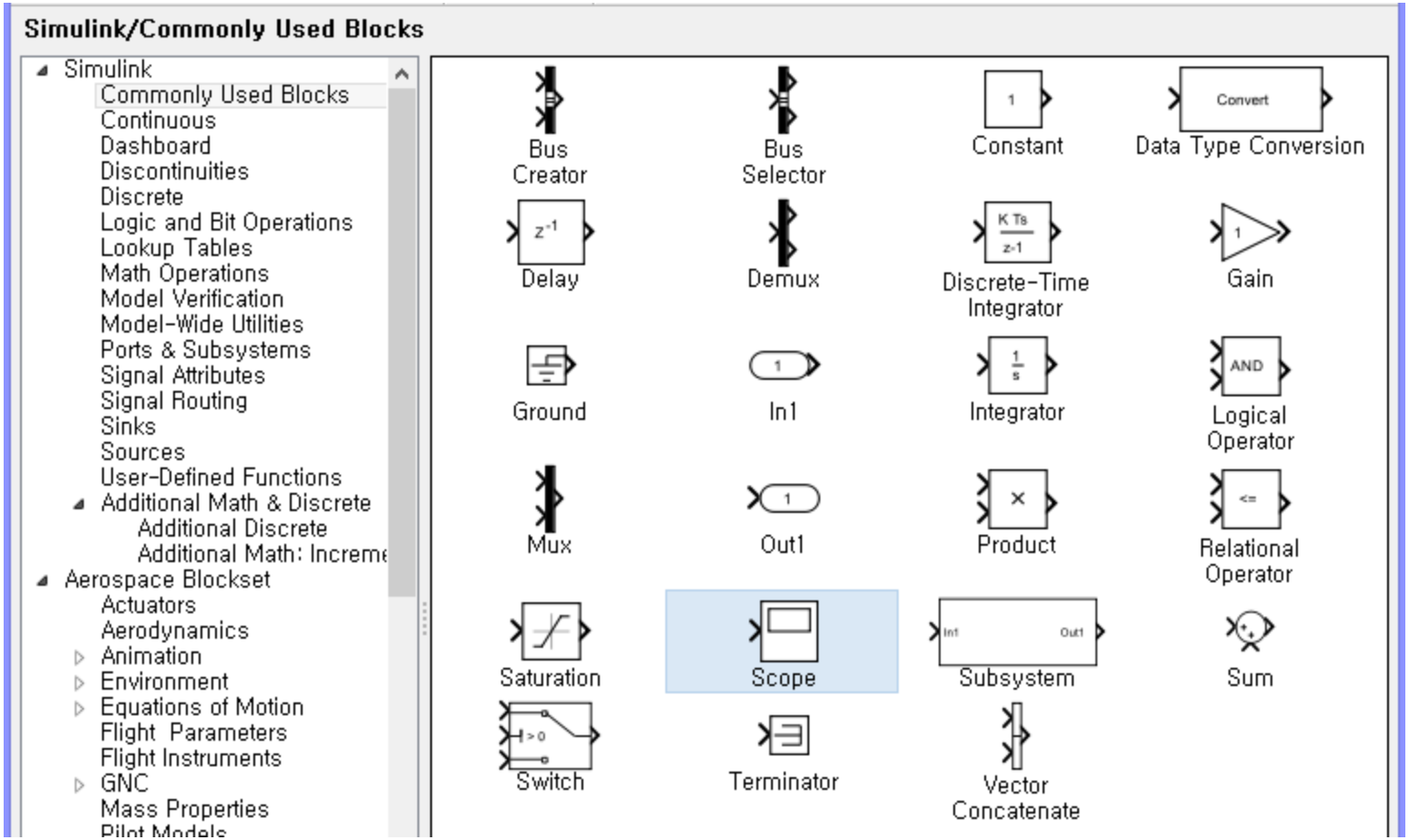
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Additional Discrete
Additional Math: Increme
Aerospace Blockset
Actuators
Aerodynamics
Animation
du/dt
Derivative
Integrator
Integrator, Second-Order
Integrator, Second-Order Limited
Integrator Limited
PID(s)
PID Controller
Ref
PID(s)
PID Controller (2DOF)
x' = Ax+Bu
y = Cx+Du
State-Space
Transfer Fcn
Transport Delay
To
Variable Time Delay
Ti
Variable Transport Delay
(s-1)
s(s+1)
Zero-Pole


Simulink/Commonly Used Blocks
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
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Lookup Tables
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Model Verification
Model-Wide Utilities
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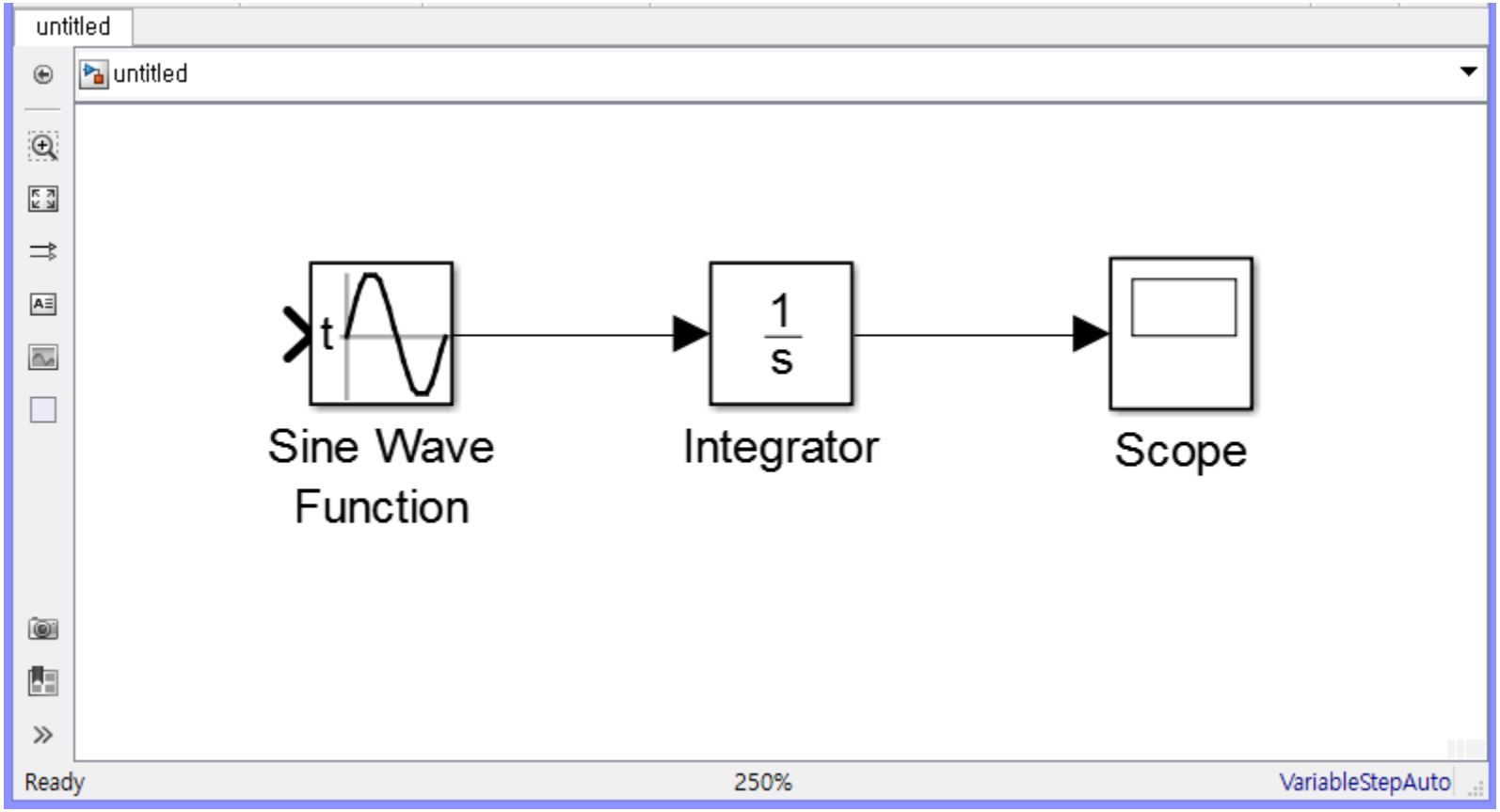
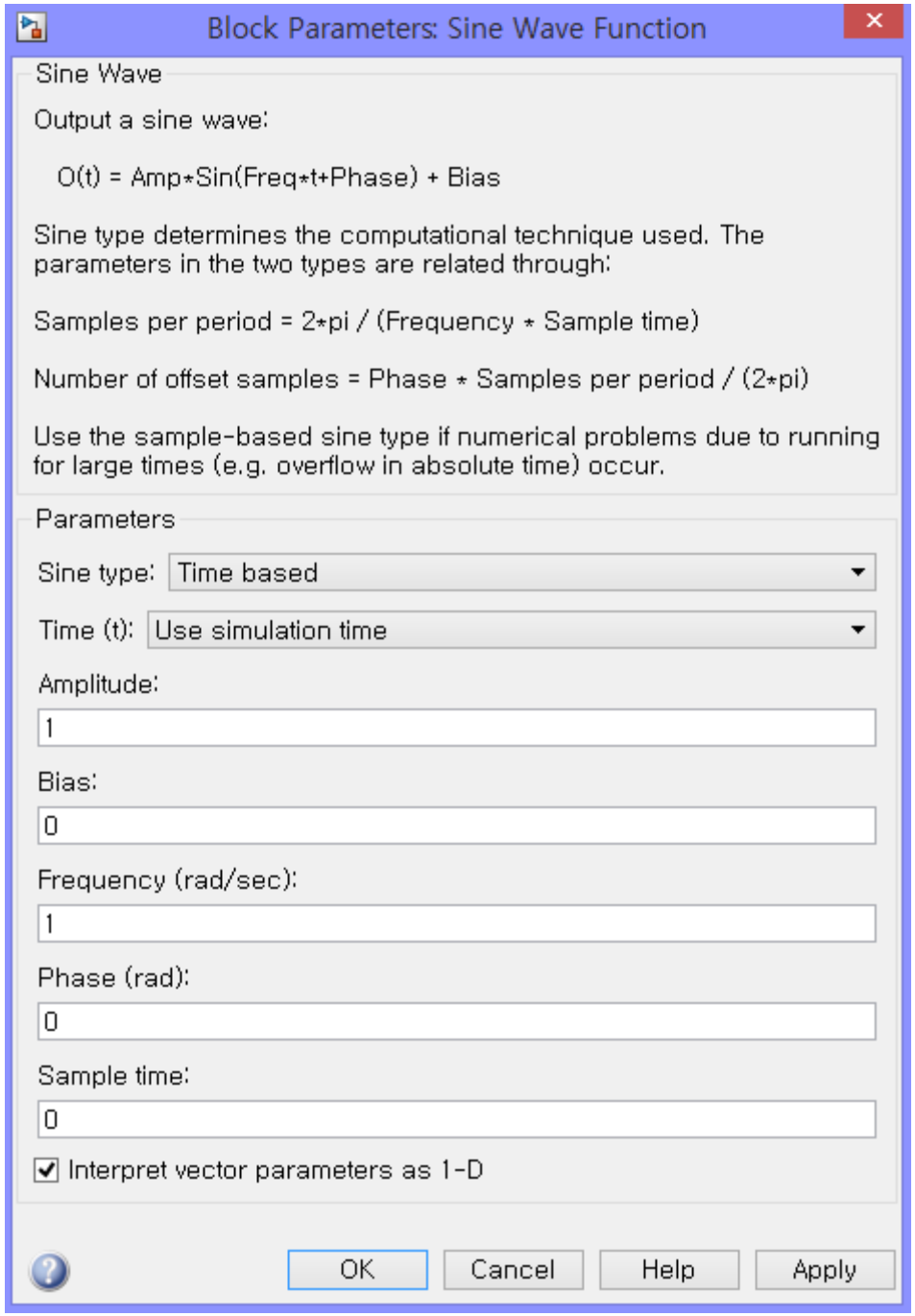
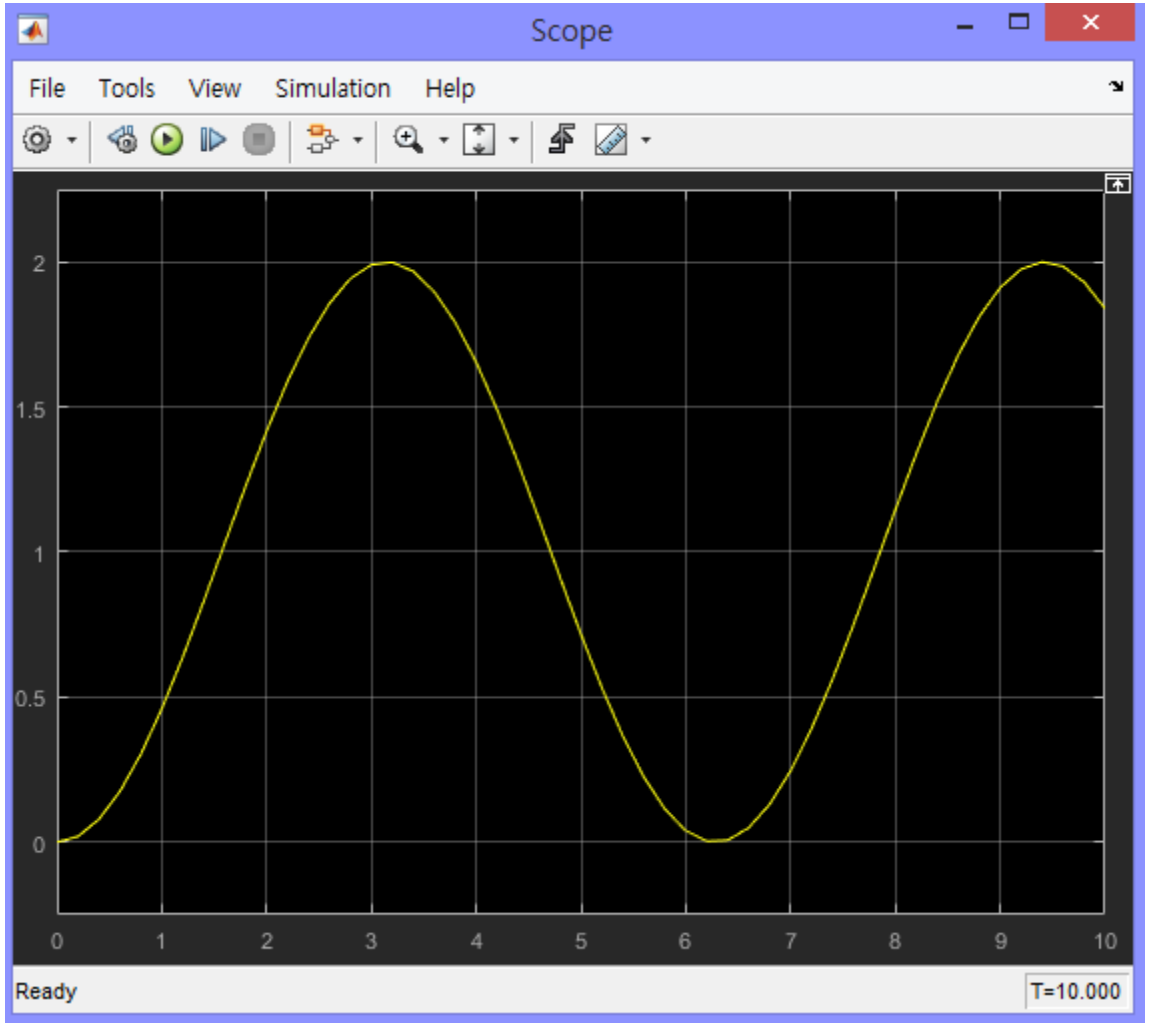
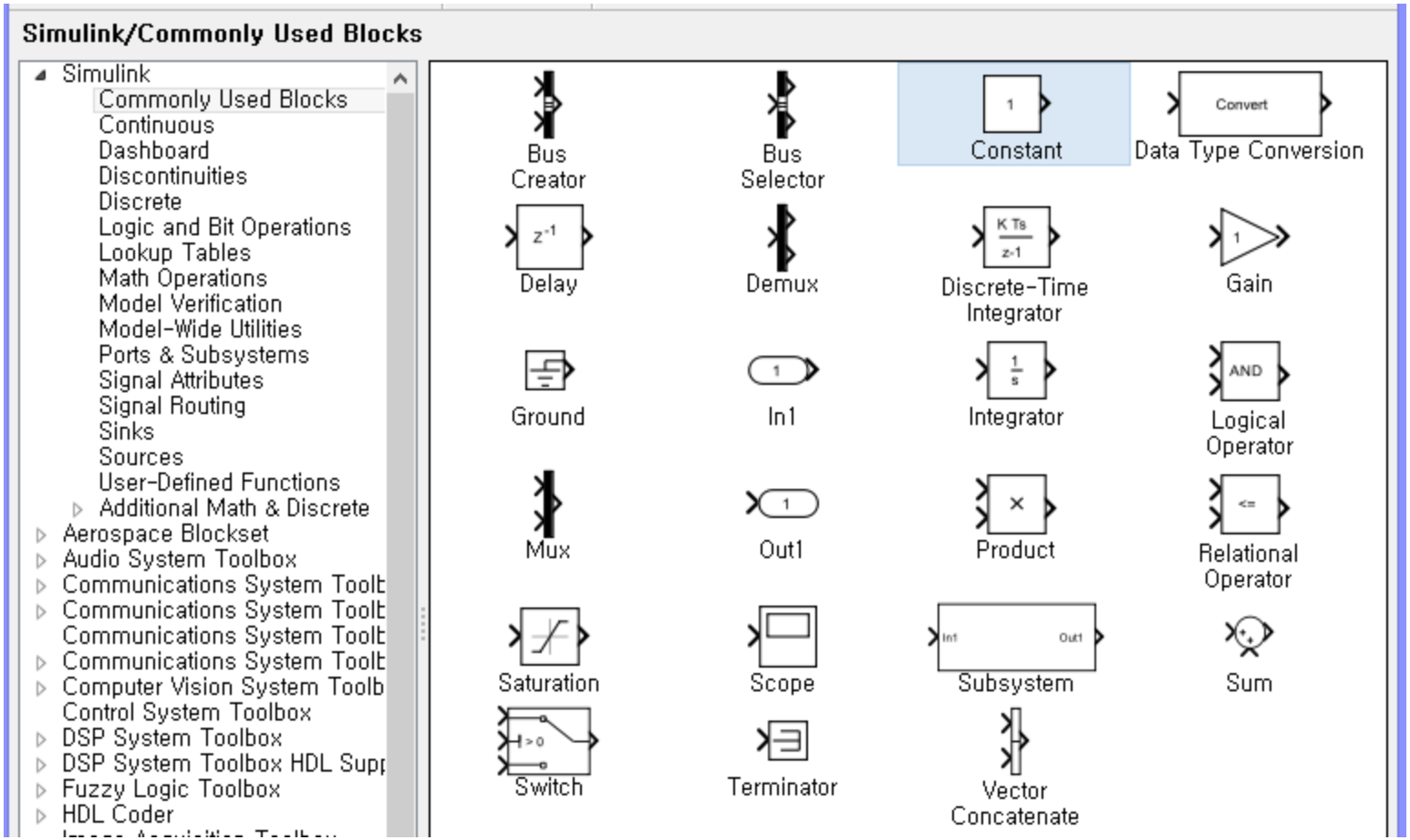
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Additional Discrete
Additional Math: Increme
Aerospace Blockset
Actuators
Aerodynamics
Animation
Environment
Equations of Motion
Flight Parameters
Flight Instruments
GNC
Mass Properties
Bus Creator
Bus Selector
Constant
Data Type Conversion
Delay
Demux
Discrete-Time Integrator
Gain
Ground
In1
Integrator
Logical Operator
Mux
Out1
Product
Relational Operator
Saturation
Scope
Subsystem
Sum
Switch
Terminator
Vector Concatenate


untitled
untitled
t
1
s
Sine Wave
Function
Integrator
Scope
Ready
250%
VariableStepAuto


Block Parameters: Sine Wave Function
Sine Wave
Output a sine wave:
O(t) = Amp*Sin(Freq*t+Phase) + Bias
Sine type determines the computational technique used. The parameters in the two types are related through:
Samples per period = 2*pi / (Frequency * Sample time)
Number of offset samples = Phase * Samples per period / (2*pi)
Use the sample-based sine type if numerical problems due to running for large times (e.g. overflow in absolute time) occur.
Parameters
Sine type: Time based
Time (t): Use simulation time
Amplitude:
1
Bias:
0
Frequency (rad/sec):
1
Phase (rad):
0
Sample time:
0
Interpret vector parameters as 1-D
OK
Cancel
Help
Apply


Scope
File
Tools
View
Simulation
Help
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8
9
10
Ready
T=10.000


Simulink/Commonly Used Blocks
Simulink
Commonly Used Blocks
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Aerospace Blockset
Audio System Toolbox
Communications System Toolb
Communications System Toolb
Communications System Toolb
Communications System Toolb
Computer Vision System Toolb
Control System Toolbox
DSP System Toolbox
DSP System Toolbox HDL Supp
Fuzzy Logic Toolbox
HDL Coder
Bus Creator
Bus Selector
Constant
Data Type Conversion
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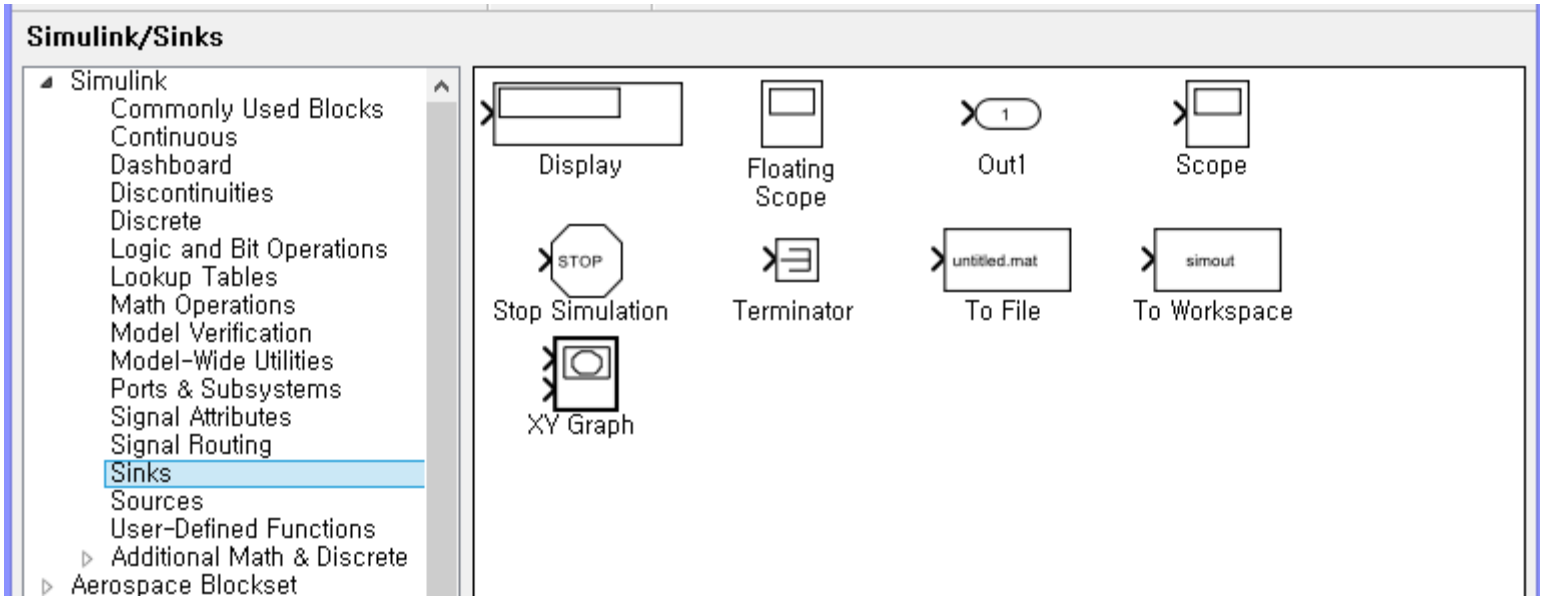
Demux
Discrete-Time Integrator
Gain
Ground
In1
Integrator
Logical Operator
Mux
Out1
Product
Relational Operator
Saturation
Scope
Subsystem
Sum
Switch
Terminator
Vector Concatenate


Simulink/Sinks
Simulink
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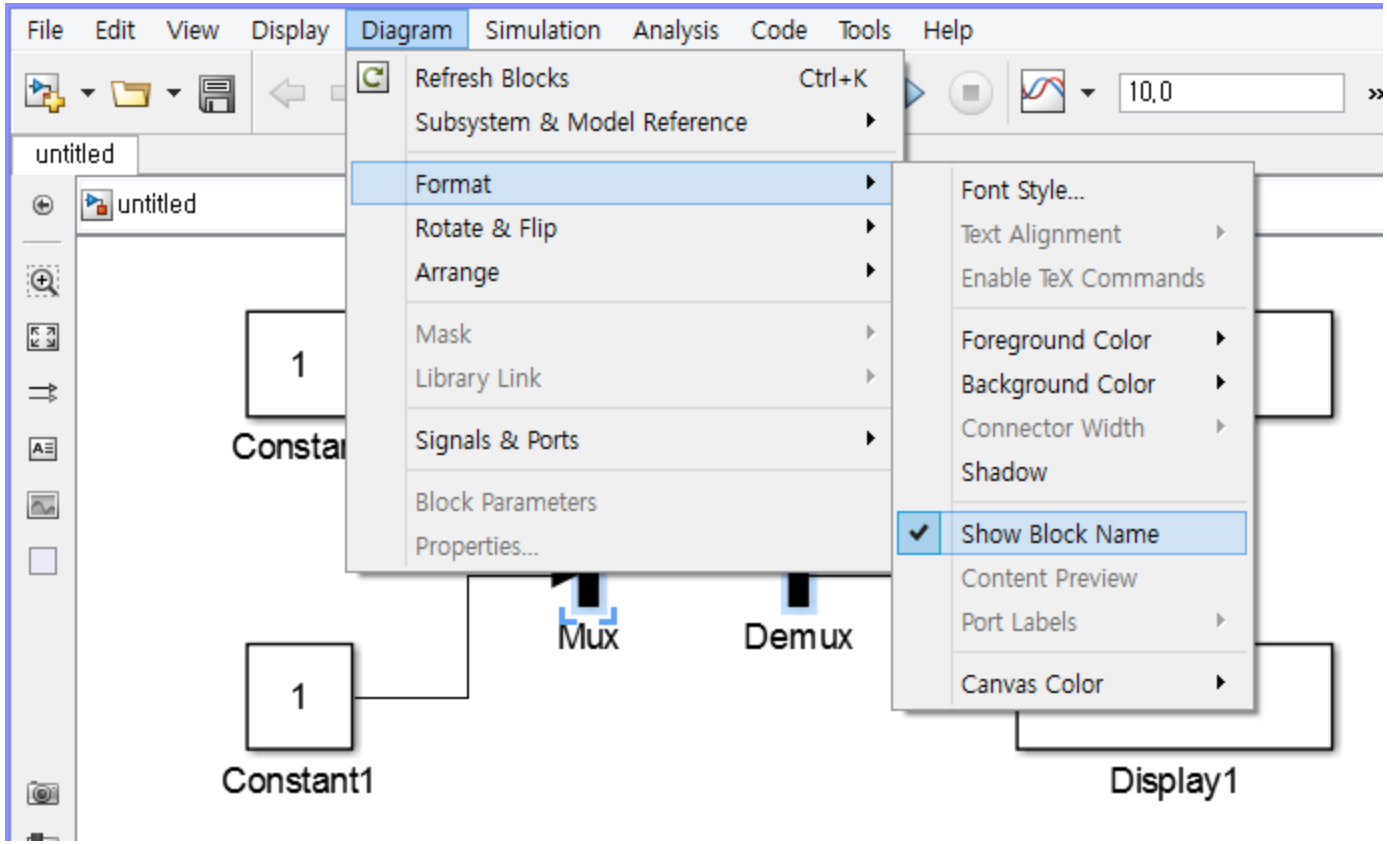
Display
Floating Scope
1
Out1
Scope
STOP
Stop Simulation
Terminator
untitled.mat
To File
simout
To Workspace
XY Graph


File
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Refresh Blocks
Ctrl+K
Subsystem & Model Reference
Format
Rotate & Flip
Arrange
Mask
Library Link
Signals & Ports
Block Parameters
Properties...
Font Style...
Text Alignment
Enable TeX Commands
Foreground Color
Background Color
Connector Width
Shadow
Show Block Name
Content Preview
Port Labels
Canvas Color
10.0
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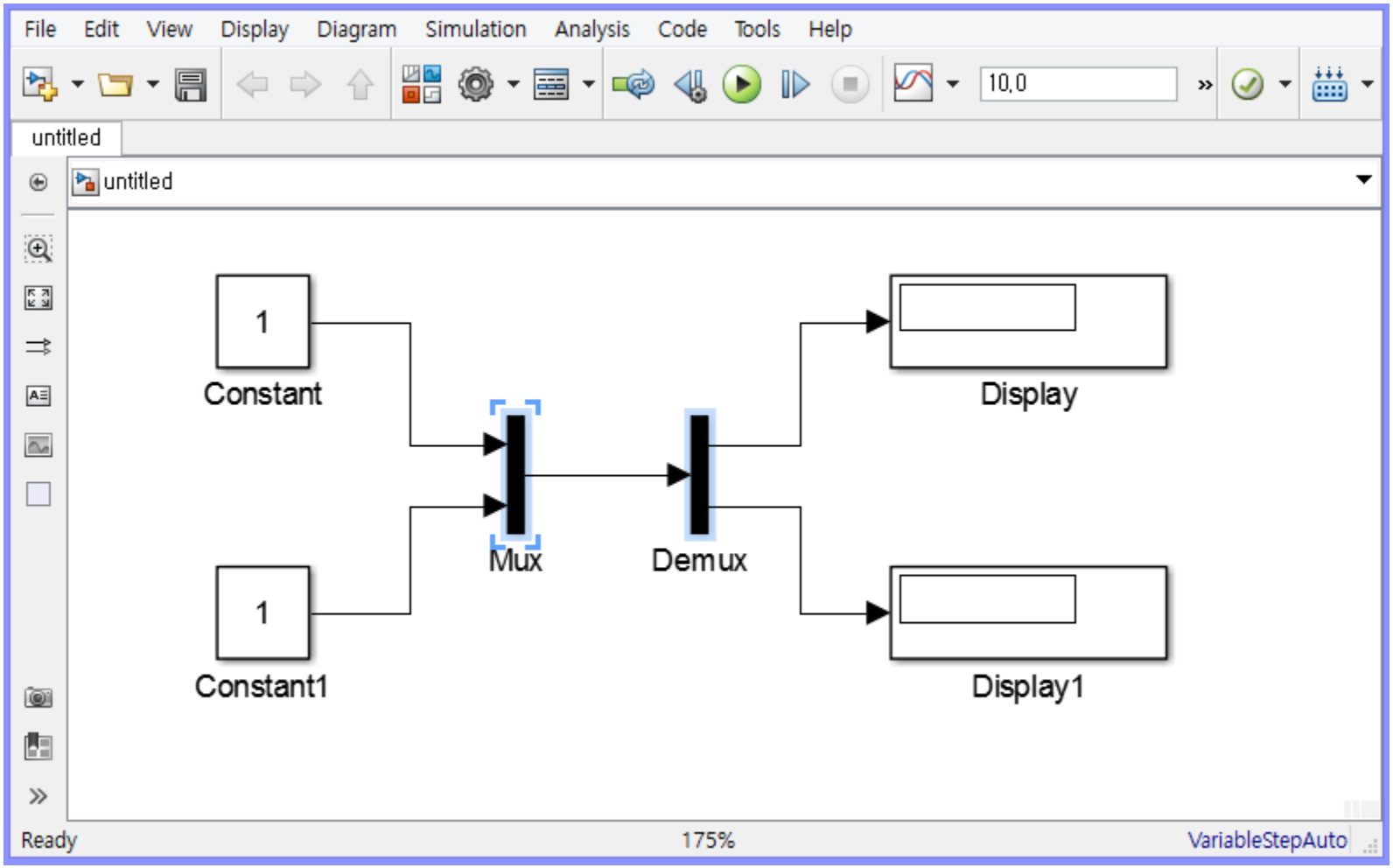
1
Constar
Mux
Demux
1
Constant1
Display1


File
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Display
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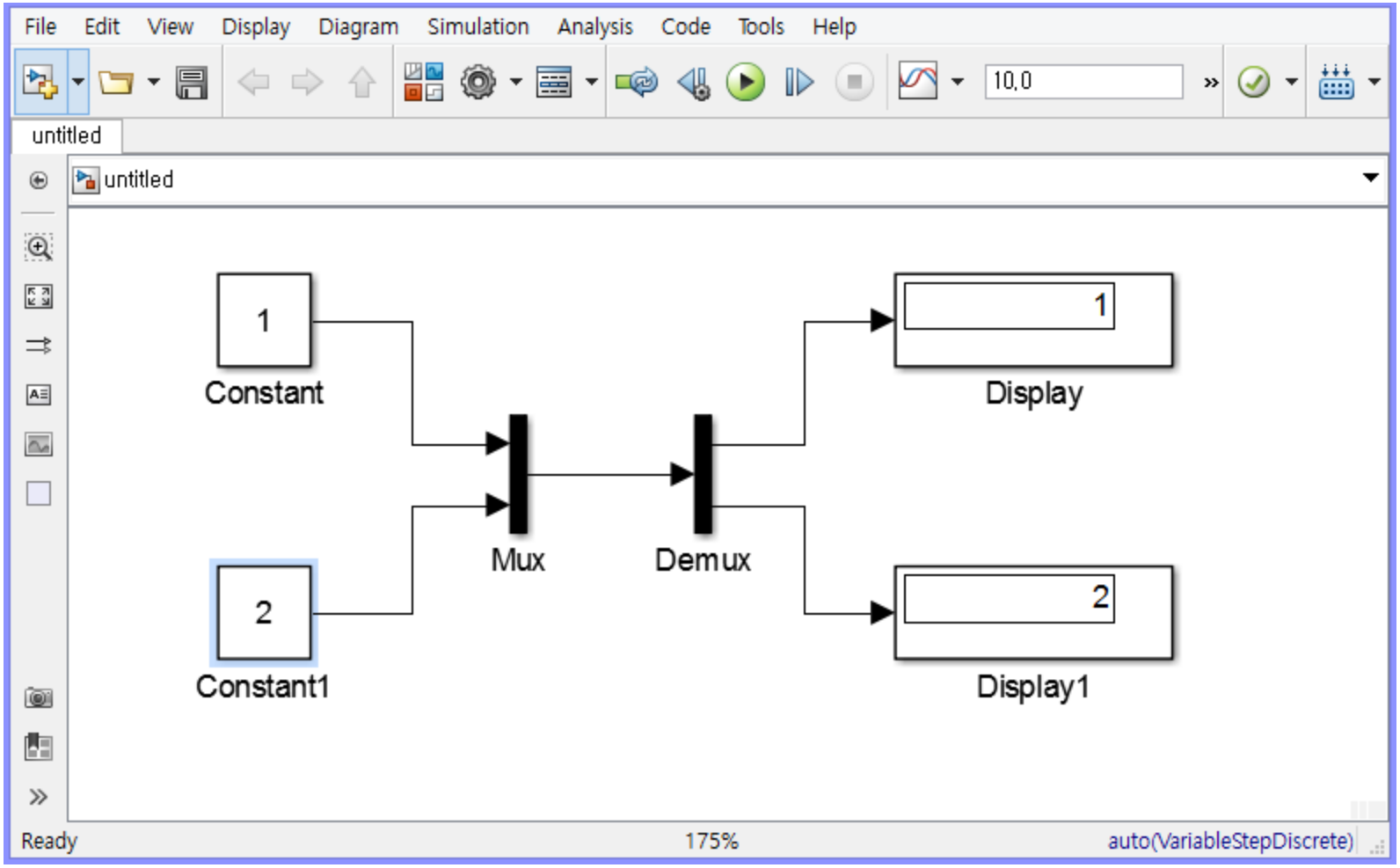
10.0
untitled
untitled
1
Constant
1
Constant1
Mux
Demux
Display
Display1
Ready
175%
VariableStepAuto


File
Edit
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Display
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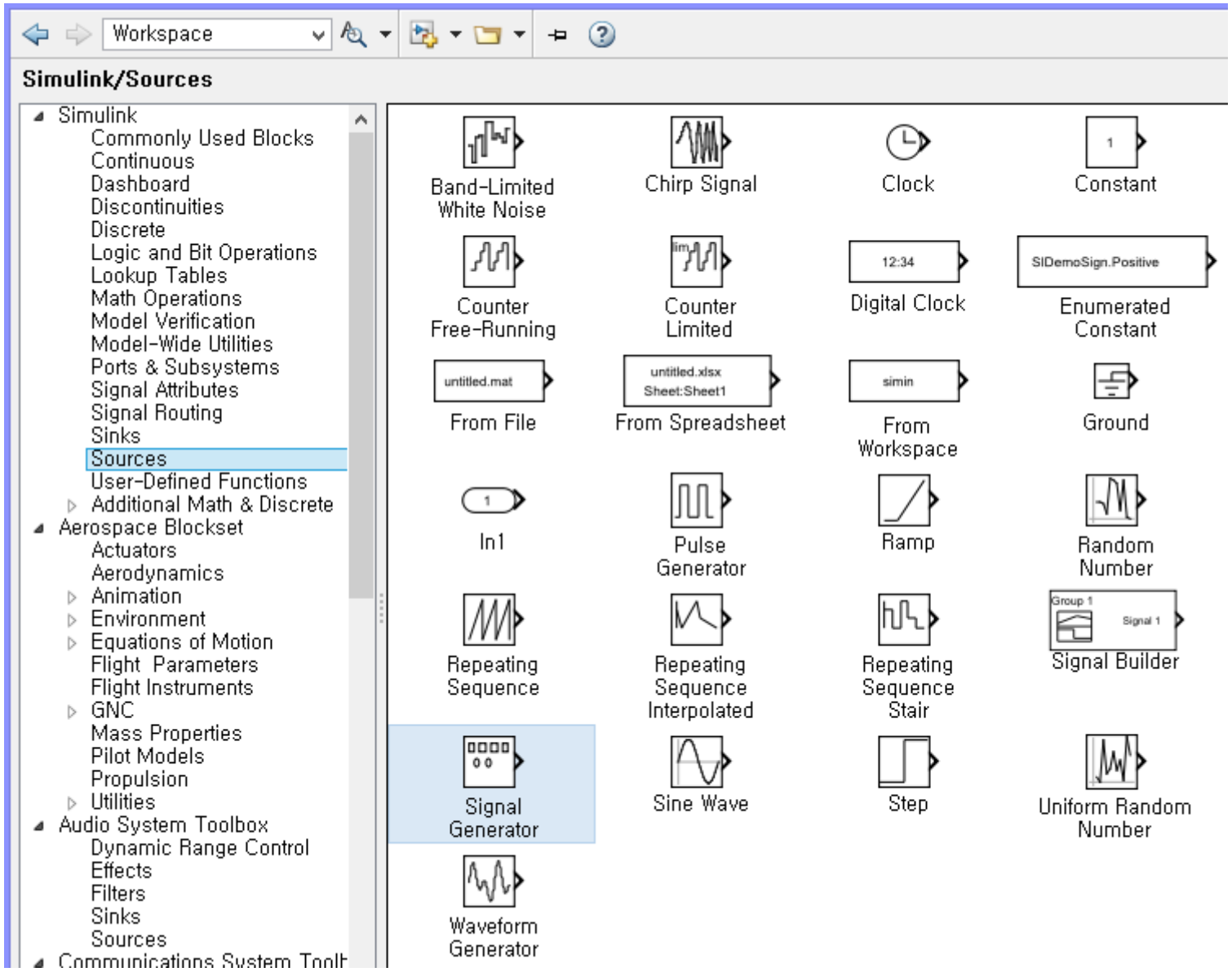
Simulation
Analysis
Code
Tools
Help
10.0
untitled
untitled
1
Constant
2
Constant1
Mux
Demux
1
Display
2
Display1
Ready
175%
auto(VariableStepDiscrete)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Sinks
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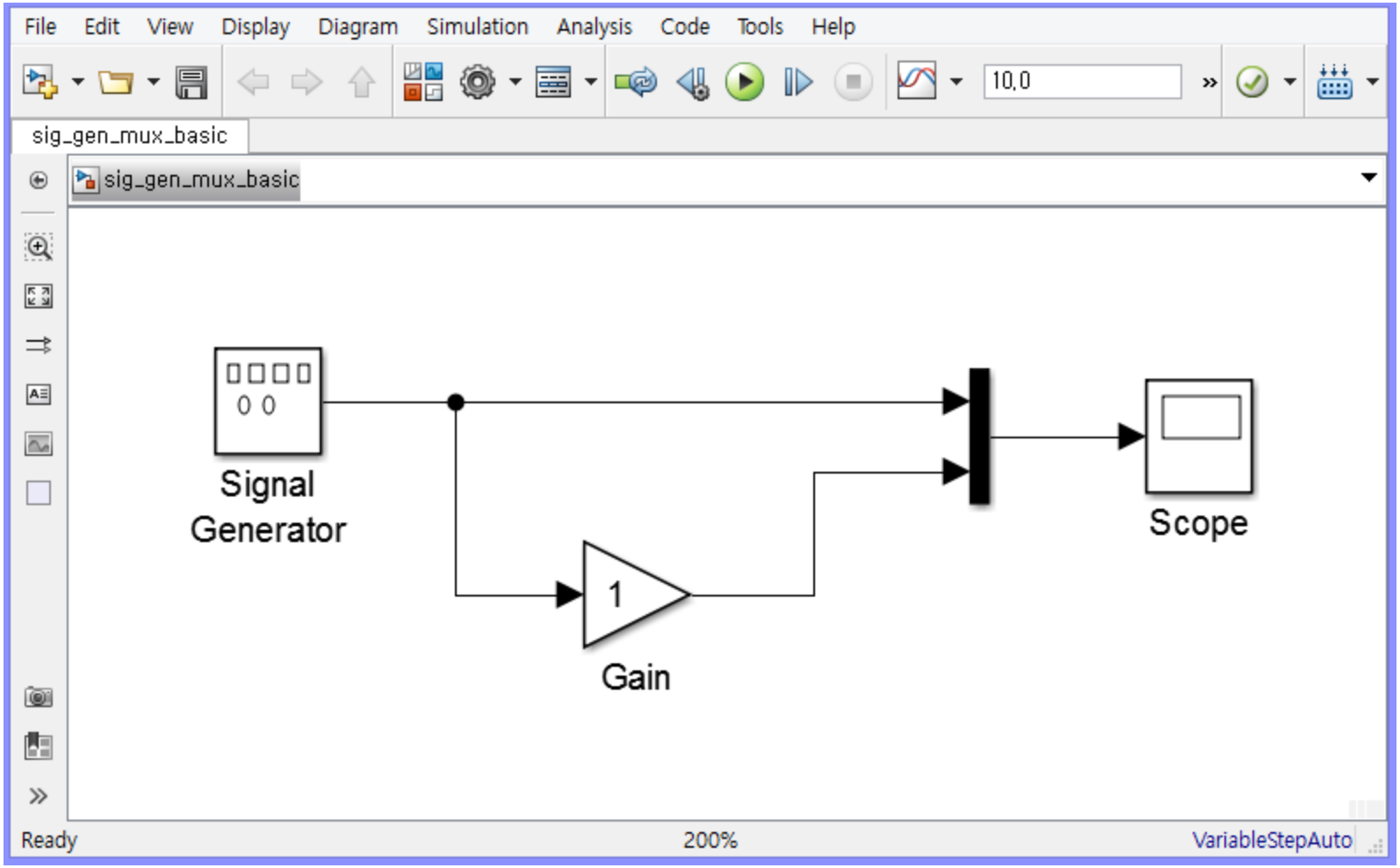
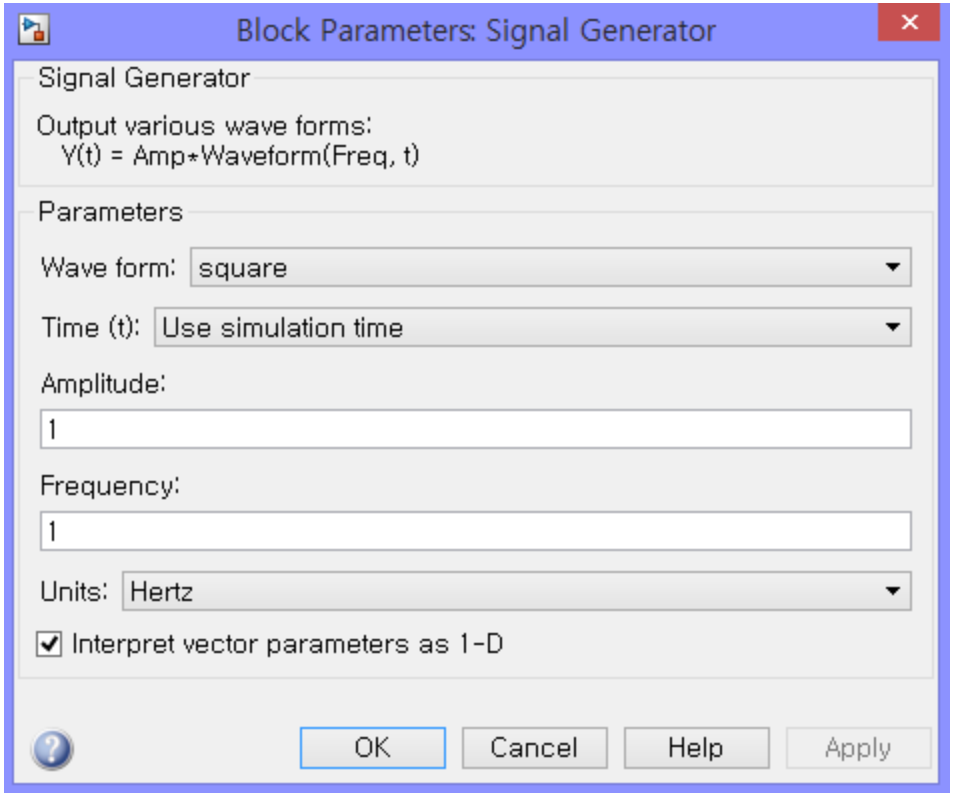
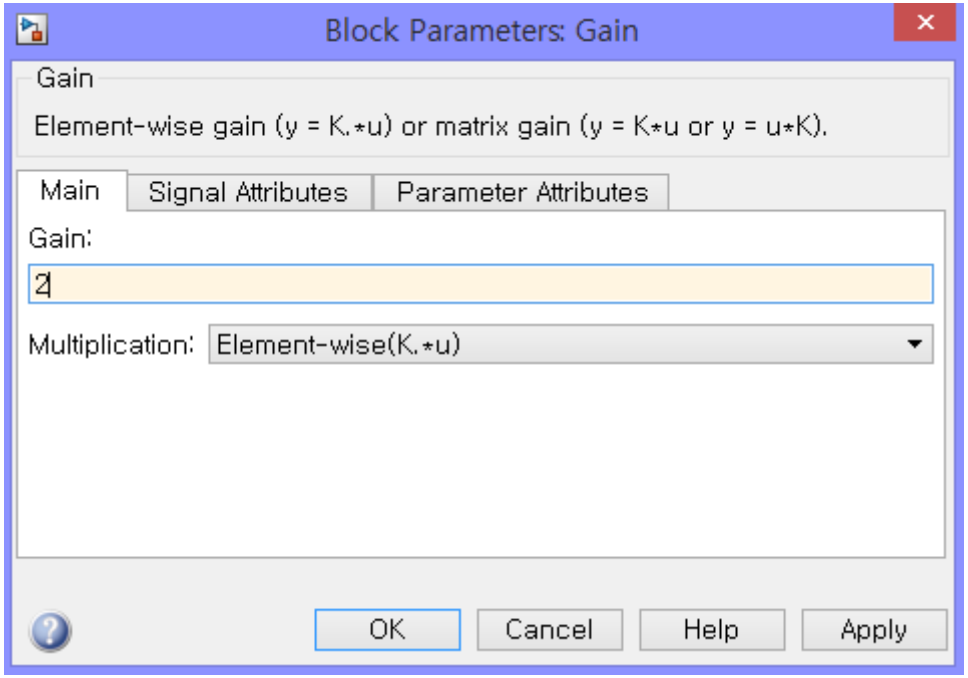
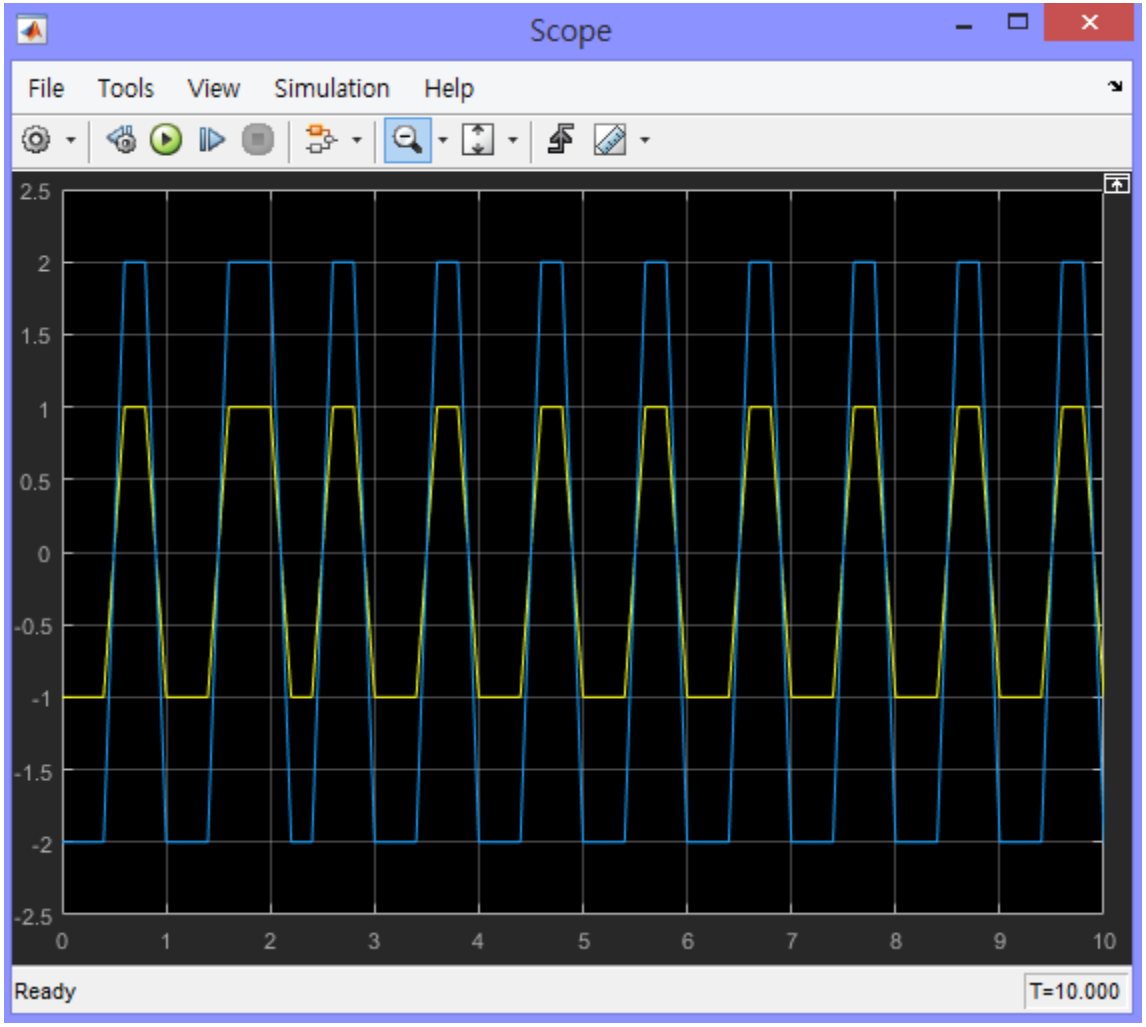
Band-Limited White Noise
Chirp Signal
Clock
Constant
Counter Free-Running
Counter Limited
12:34
Digital Clock
SIDemoSign.Positive
Enumerated Constant
untitled.mat
From File
untitled.xlsx
Sheet:Sheet1
From Spreadsheet
simin
From Workspace
Ground
In1
Pulse Generator
Ramp
Random Number
Repeating Sequence
Repeating Sequence Interpolated
Repeating Sequence Stair
Group 1
Signal 1
Signal Builder
Signal Generator
Sine Wave
Step
Uniform Random Number
Waveform Generator


File Edit View Display Diagram Simulation Analysis Code Tools Help
10.0
sig_gen_mux_basic
sig_gen_mux_basic
Signal Generator
1
Gain
Scope
Ready
200%
VariableStepAuto


Block Parameters: Signal Generator
Signal Generator
Output various wave forms:
Y(t) = Amp*Waveform(Freq, t)
Parameters
Wave form: square
Time (t): Use simulation time
Amplitude:
1
Frequency:
1
Units: Hertz
Interpret vector parameters as 1-D
OK
Cancel
Help
Apply


Block Parameters: Gain
Gain
Element-wise gain (y = K.*u) or matrix gain (y = K*u or y = u*K).
Main
Signal Attributes
Parameter Attributes
Gain:
2
Multiplication:
Element-wise(K.*u)
OK
Cancel
Help
Apply


Scope
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2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
1
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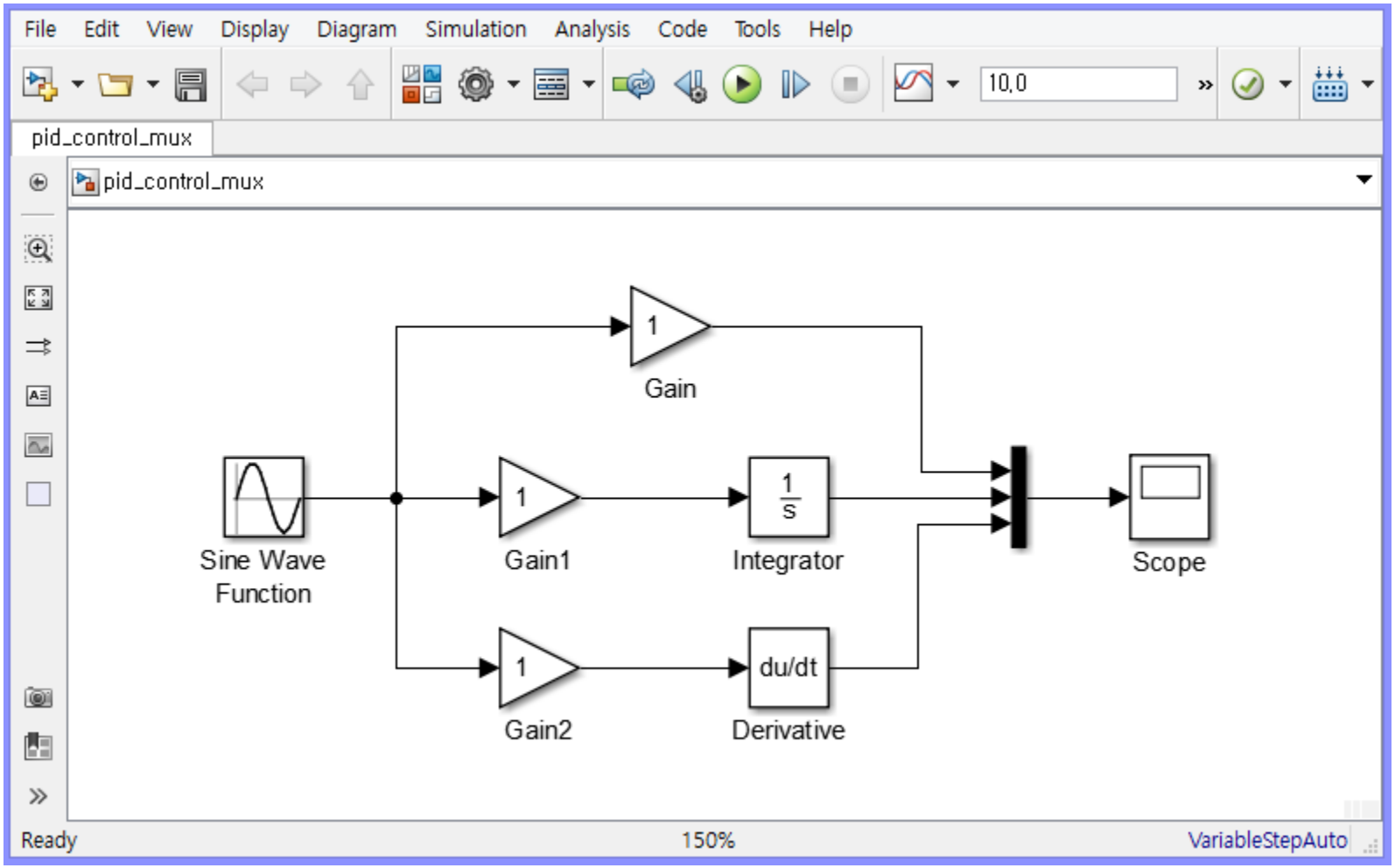
10
Ready
T=10.000


File
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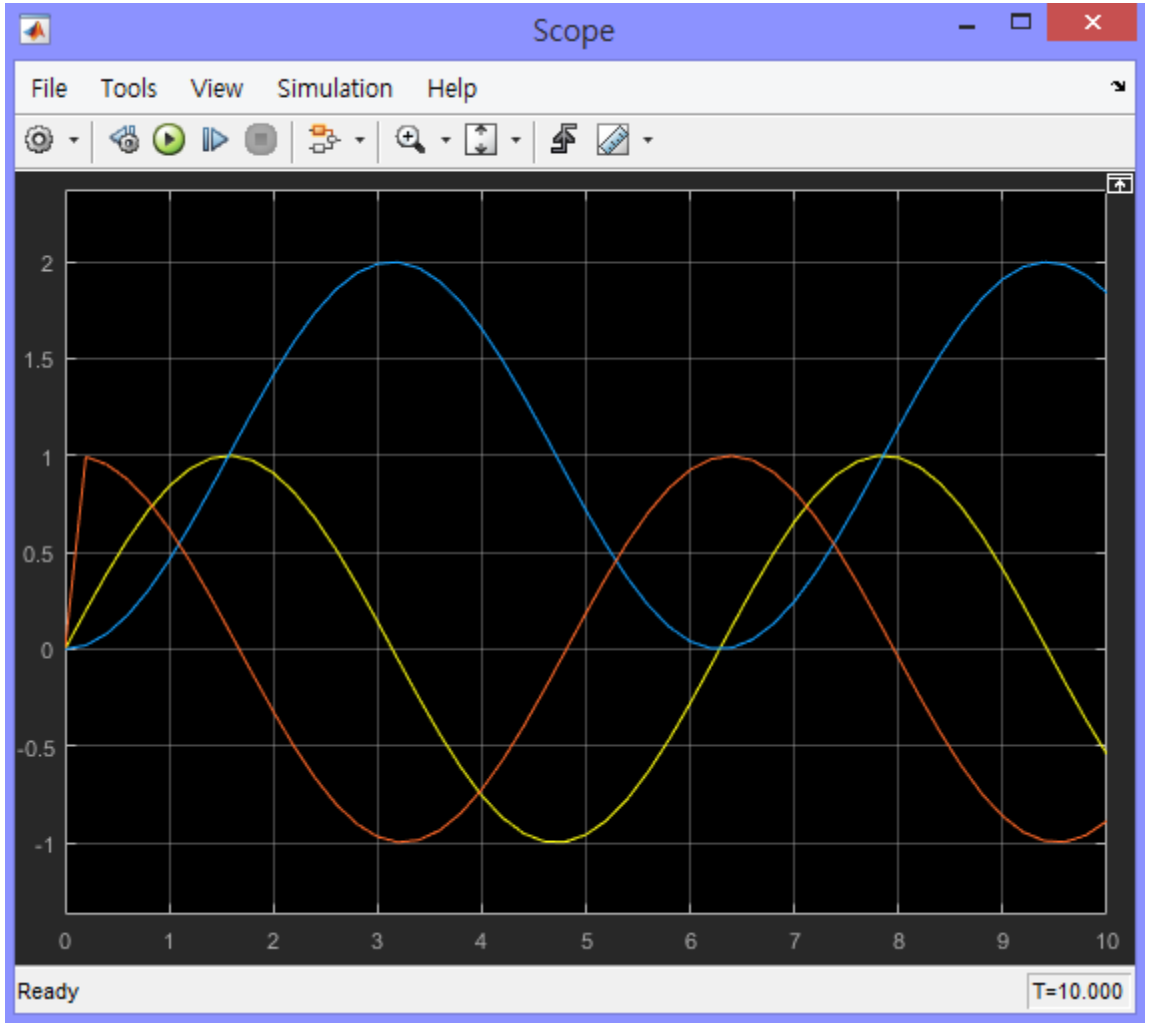
10.0
pid_control_mux
pid_control_mux
1
Gain
Sine Wave
Function
1
Gain1
1
s
Integrator
Scope
1
Gain2
du/dt
Derivative
Ready
150%
VariableStepAuto


Scope
File
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2
1.5
1
0.5
0
-0.5
-1
0
1
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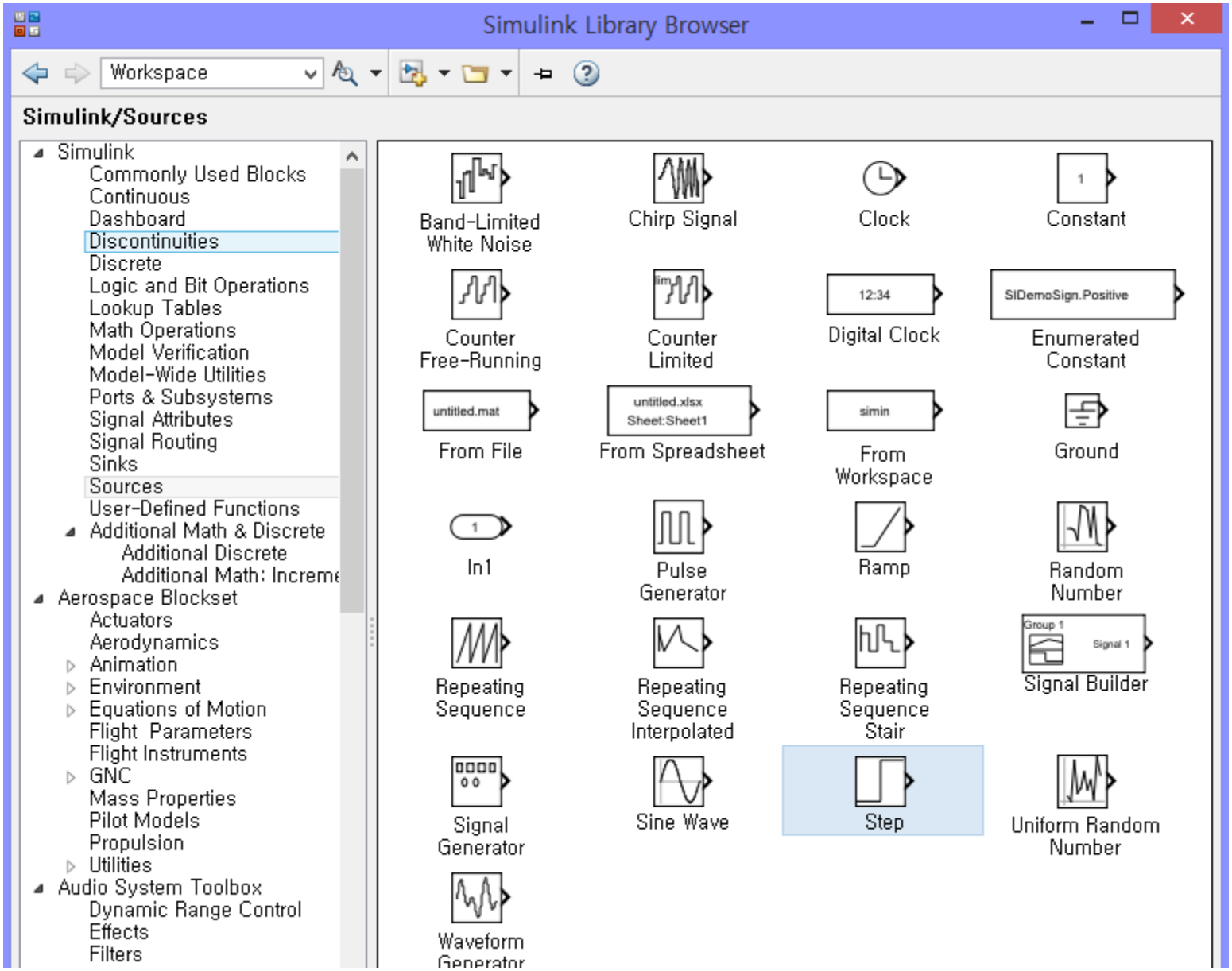
3
4
5
6
7
8
9
10
Ready
T=10.000


Simulink Library Browser
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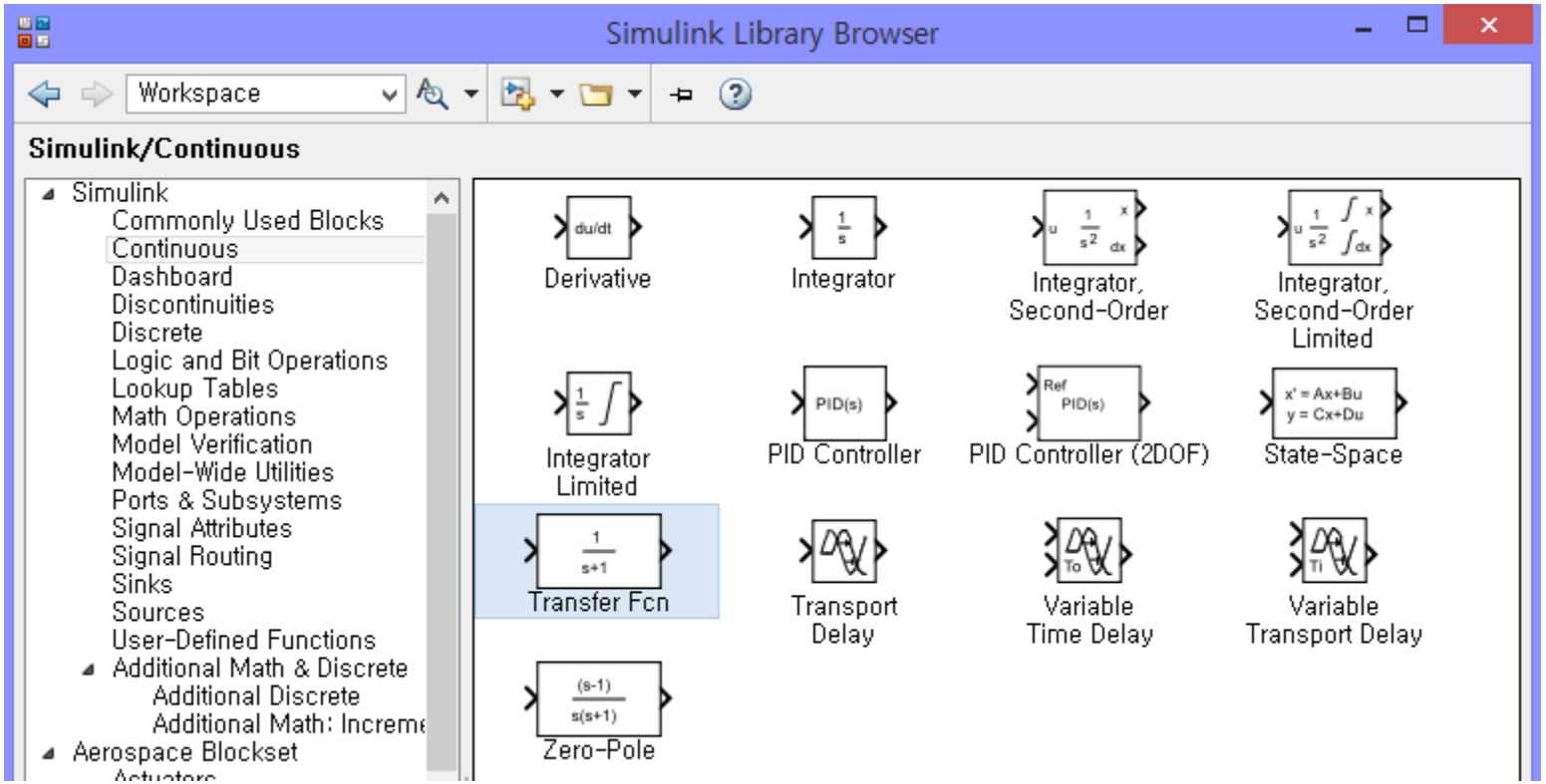
Chirp Signal
Clock
Constant
Counter Free-Running
Counter Limited
12:34
Digital Clock
SIDemoSign.Positive
Enumerated Constant
untitled.mat
From File
untitled.xlsx
Sheet:Sheet1
From Spreadsheet
simin
From Workspace
Ground
In1
Pulse Generator
Ramp
Random Number
Repeating Sequence
Repeating Sequence Interpolated
Repeating Sequence Stair
Group 1
Signal 1
Signal Builder
Signal Generator
Sine Wave
Step
Uniform Random Number
Waveform Generator


Simulink Library Browser
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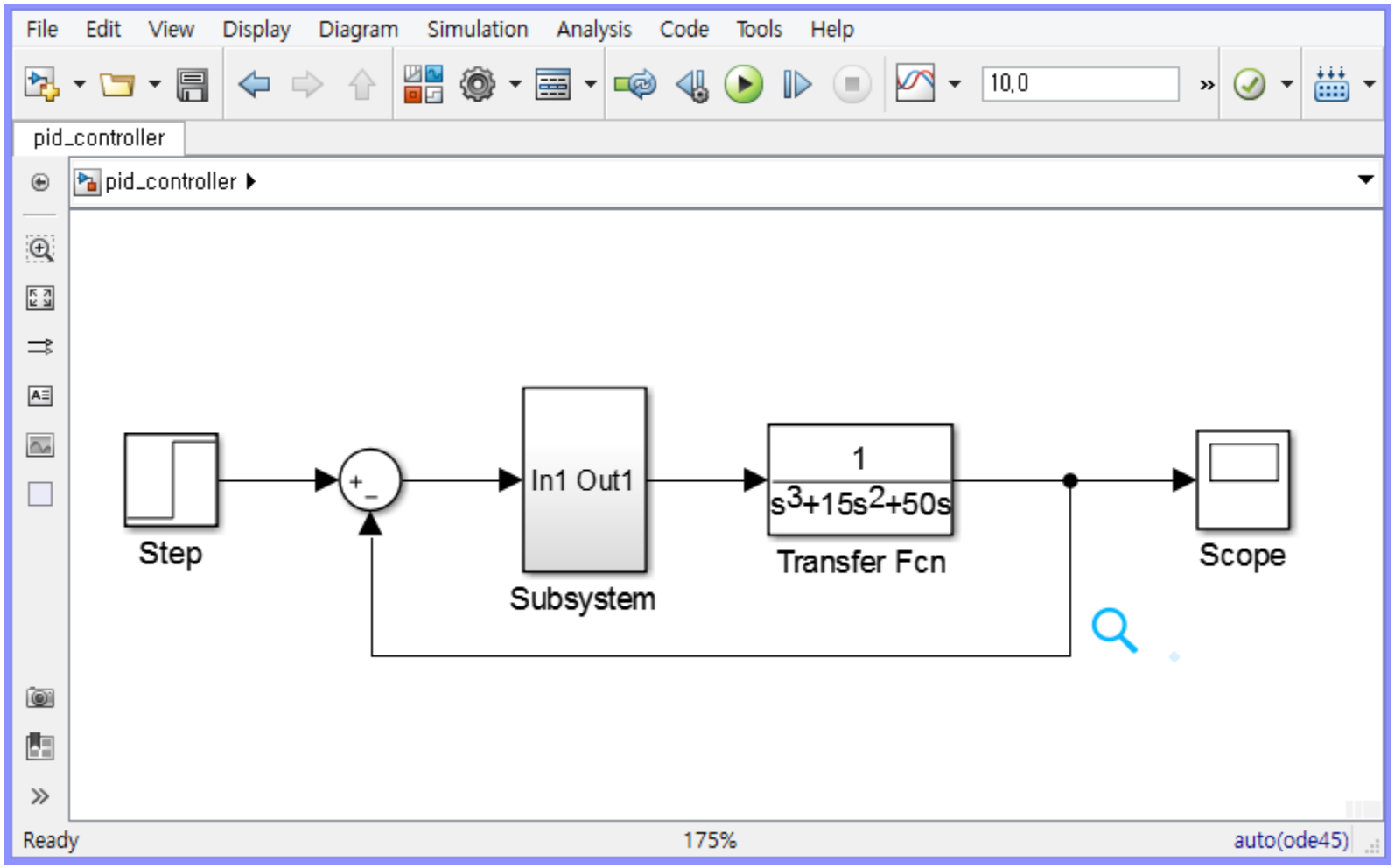
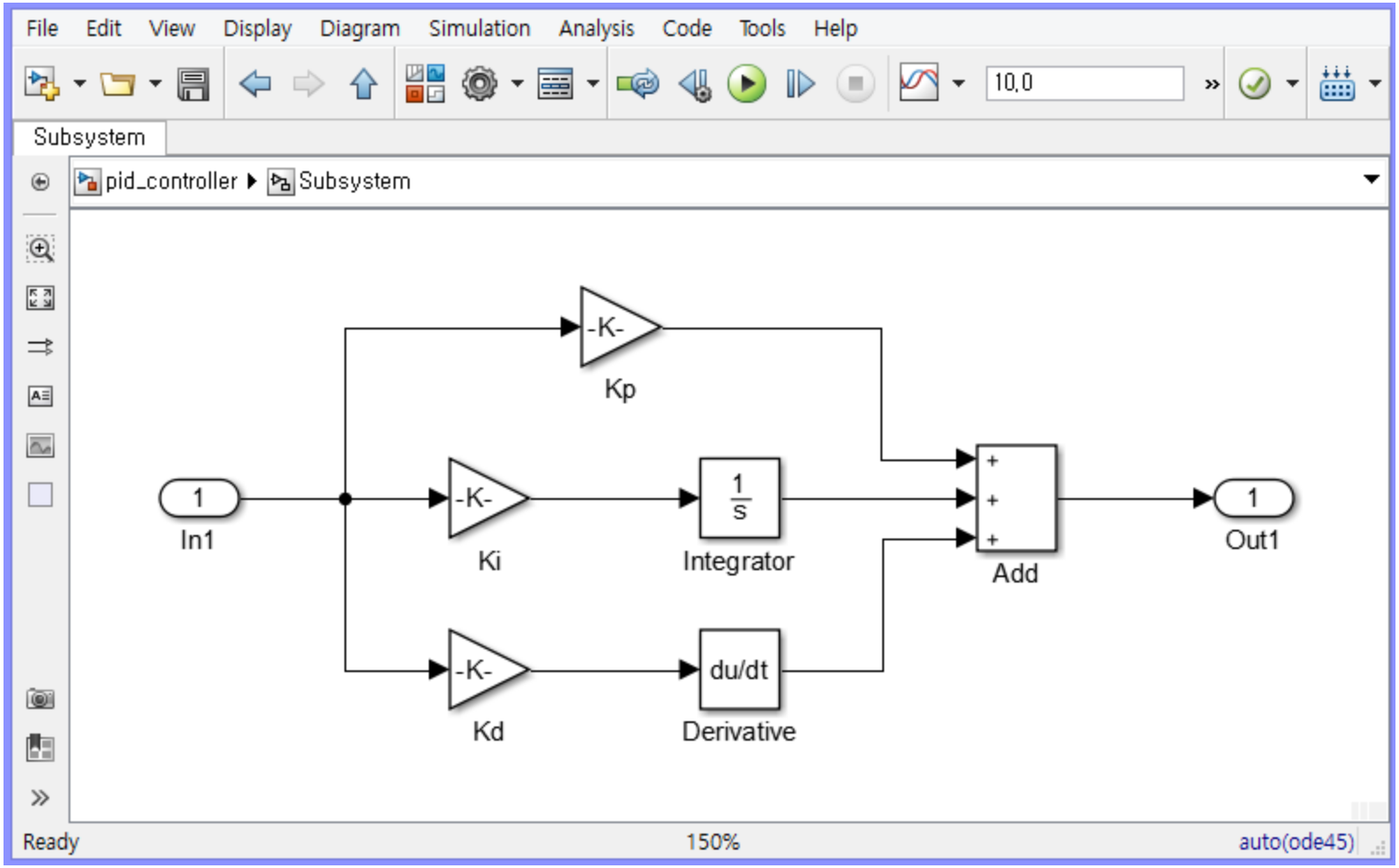
Additional Discrete
Additional Math: Increme
Aerospace Blockset
Derivative
Integrator
Integrator, Second-Order
Integrator, Second-Order Limited
Integrator Limited
PID Controller
PID Controller (2DOF)
State-Space
Transfer Fcn
Transport Delay
Variable Time Delay
Variable Transport Delay
Zero-Pole


File Edit View Display Diagram Simulation Analysis Code Tools Help
10.0
pid_controller
pid_controller
Step
In1 Out1
Subsystem
1
s3+15s2+50s
Transfer Fcn
Scope
Ready
175%
auto(ode45)


File
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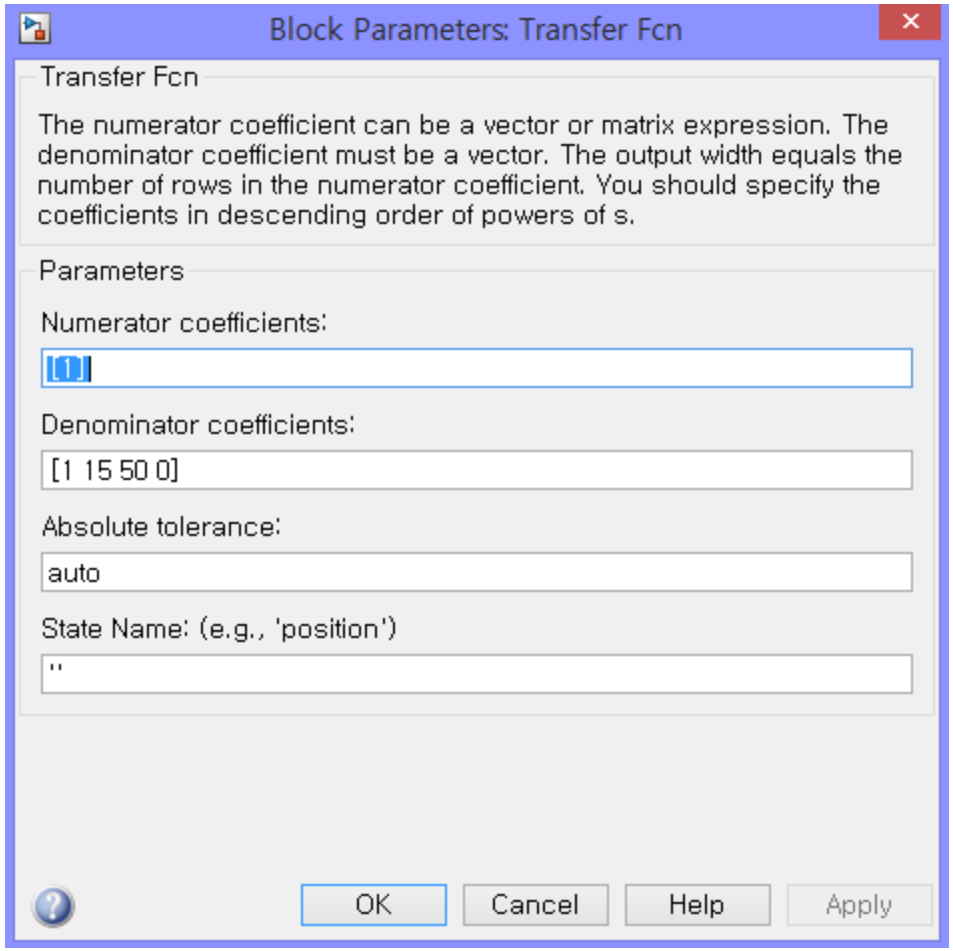
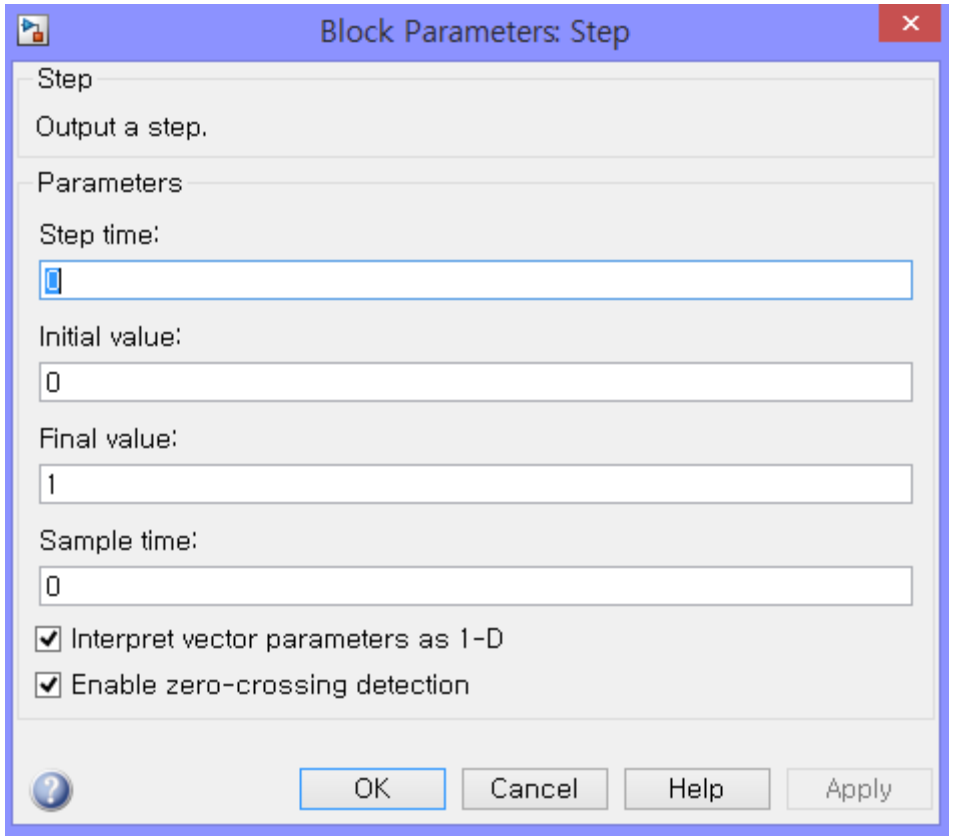
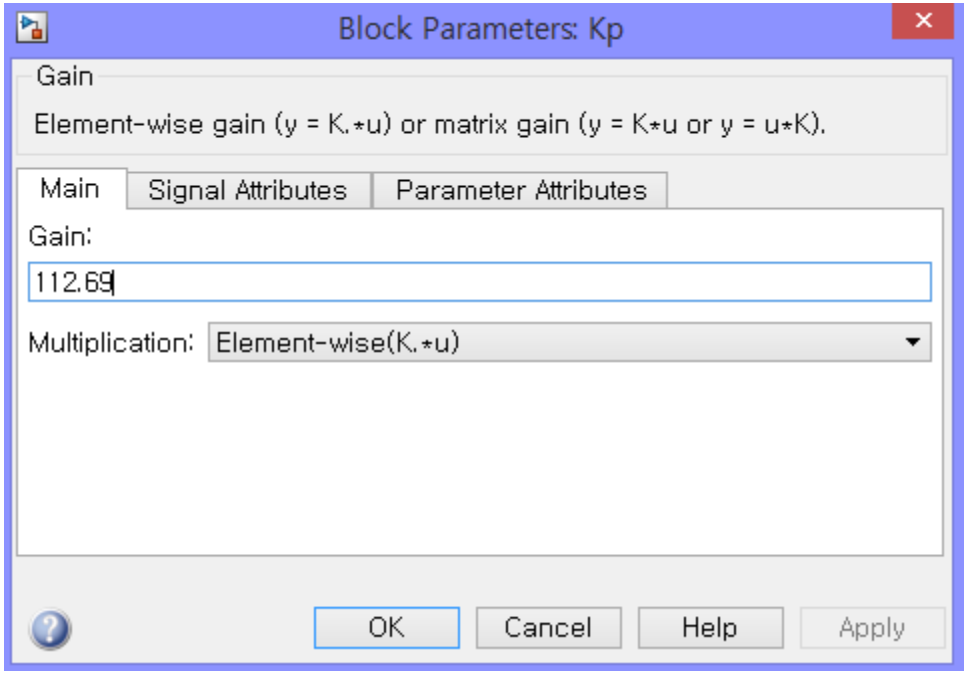
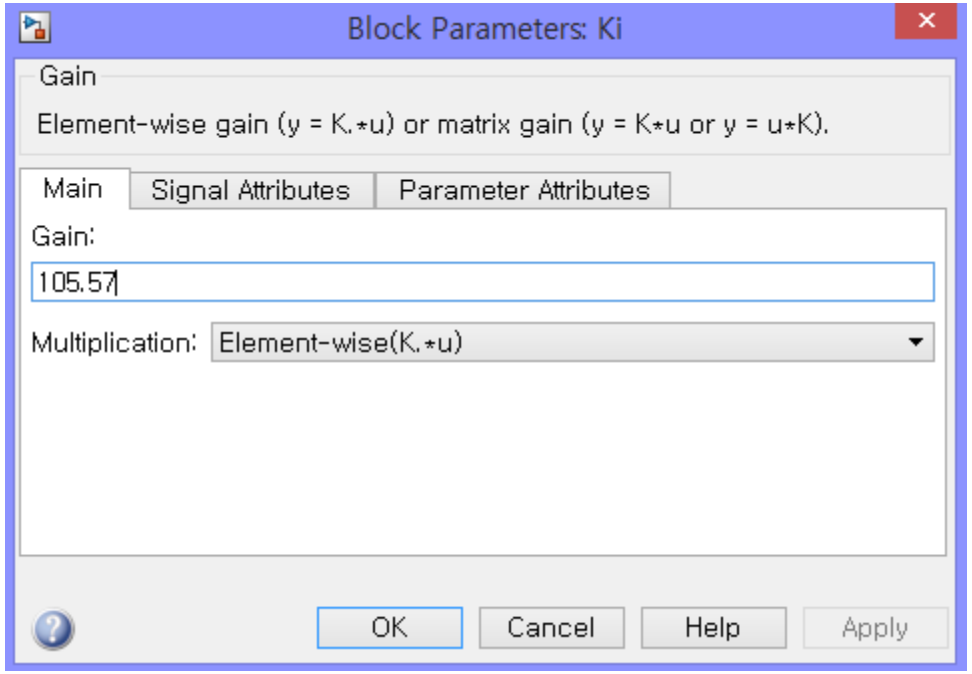
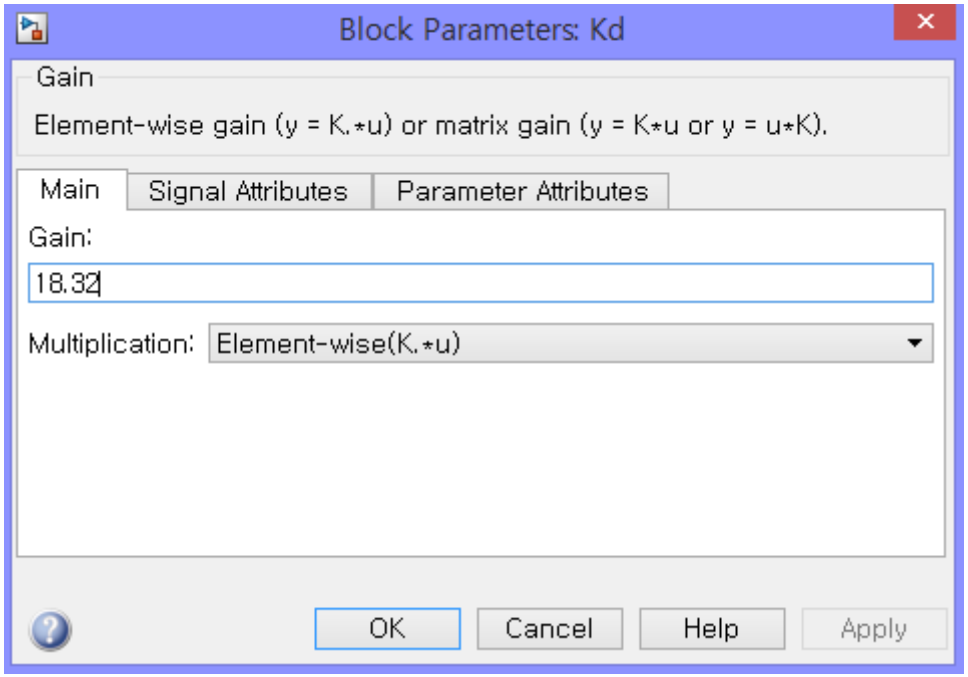
10,0
Subsystem
pid_controller
Subsystem
-K-
Kp
1
In1
-K-
Ki
1
s
Integrator
+
+
+
Add
1
Out1
-K-
Kd
du/dt
Derivative
Ready
150%
auto(ode45)

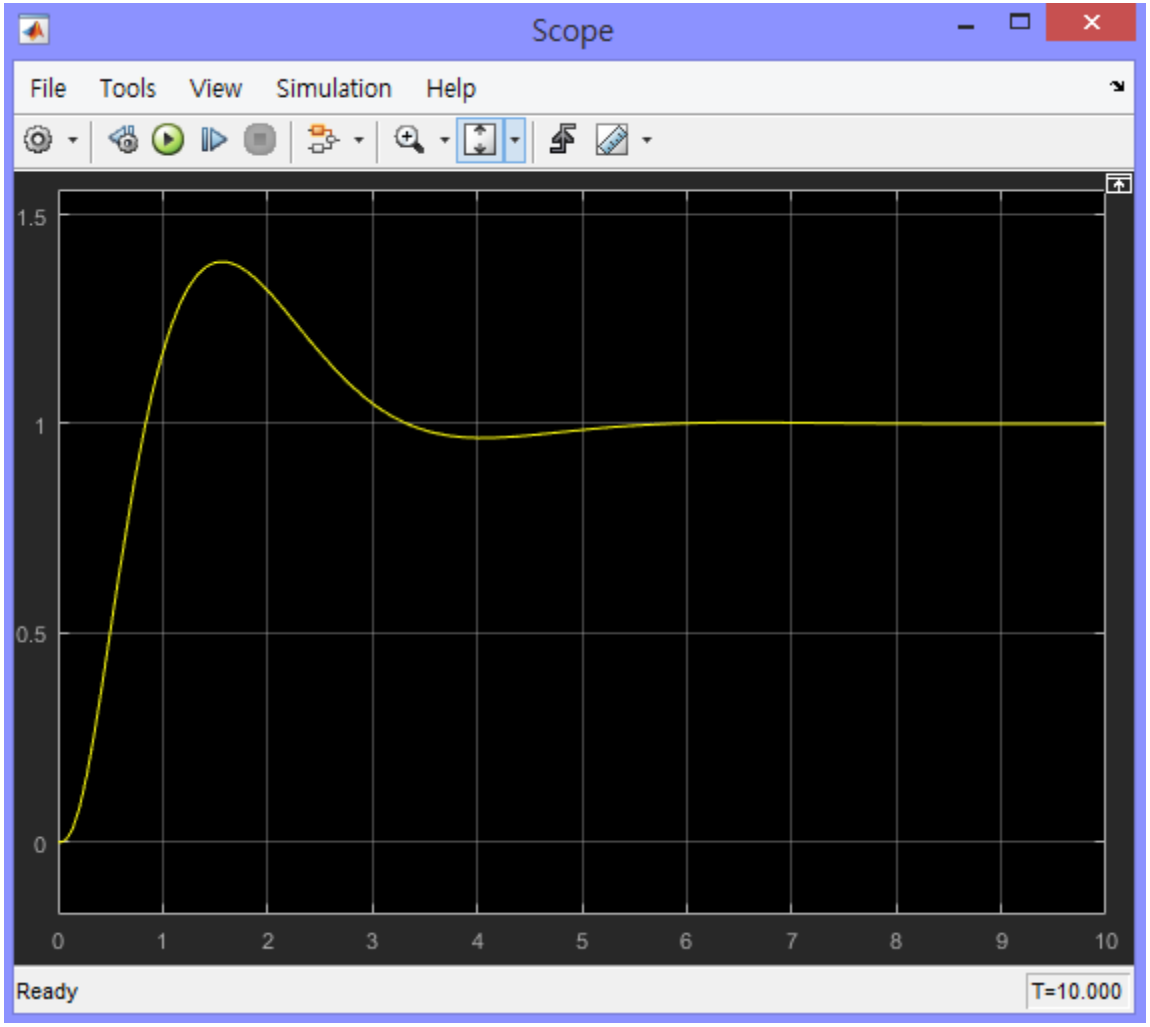

Block Parameters: Transfer Fcn
Transfer Fcn
The numerator coefficient can be a vector or matrix expression. The denominator coefficient must be a vector. The output width equals the number of rows in the numerator coefficient. You should specify the coefficients in descending order of powers of s.
Parameters
Numerator coefficients:
[1]
Denominator coefficients:
[1 15 50 0]
Absolute tolerance:
auto
State Name: (e.g., 'position')
''
OK
Cancel
Help
Apply

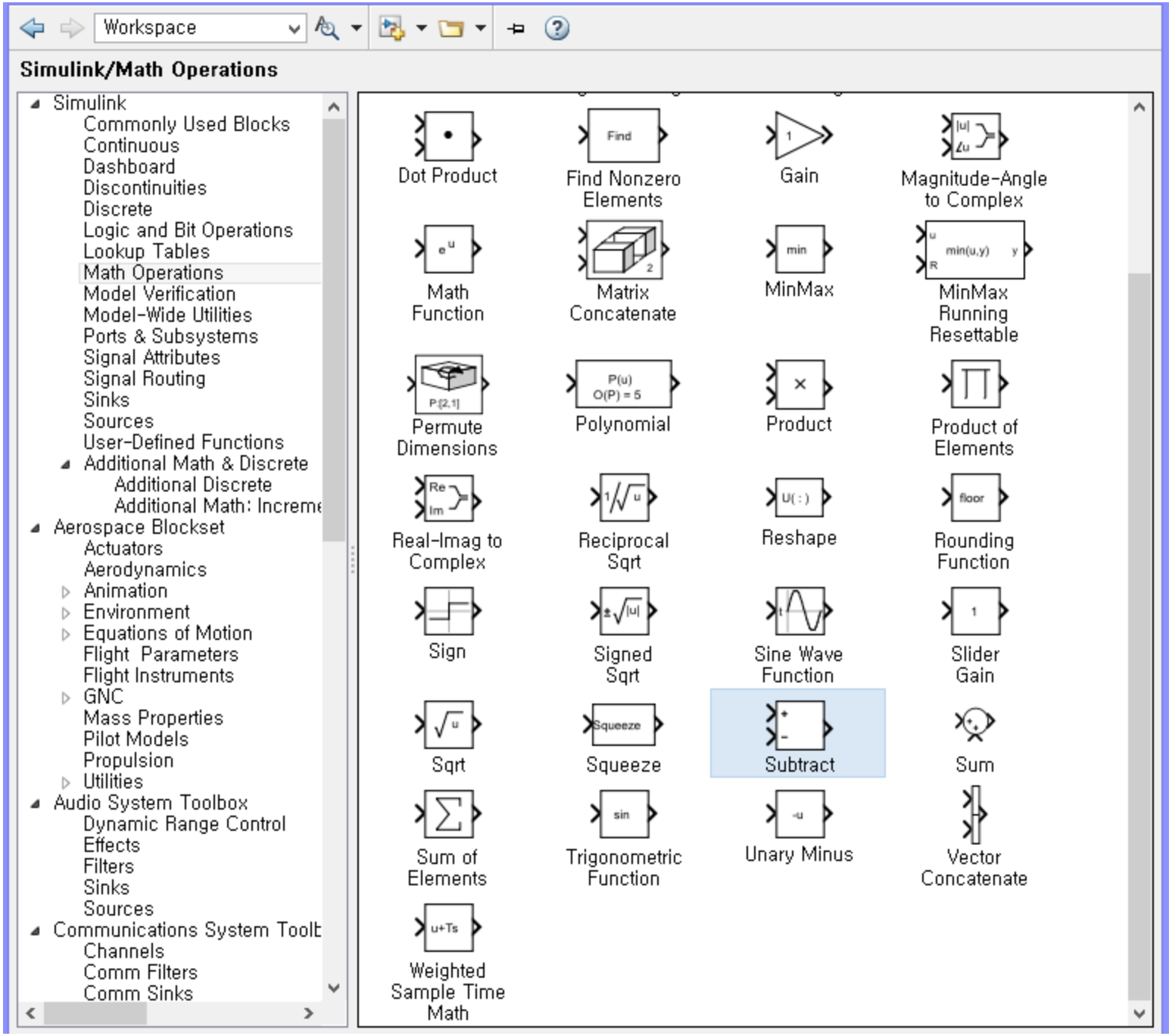

Block Parameters: Step
Step
Output a step.
Parameters
Step time:
1
Initial value:
0
Final value:
1
Sample time:
0
Interpret vector parameters as 1-D
Enable zero-crossing detection
OK
Cancel
Help
Apply

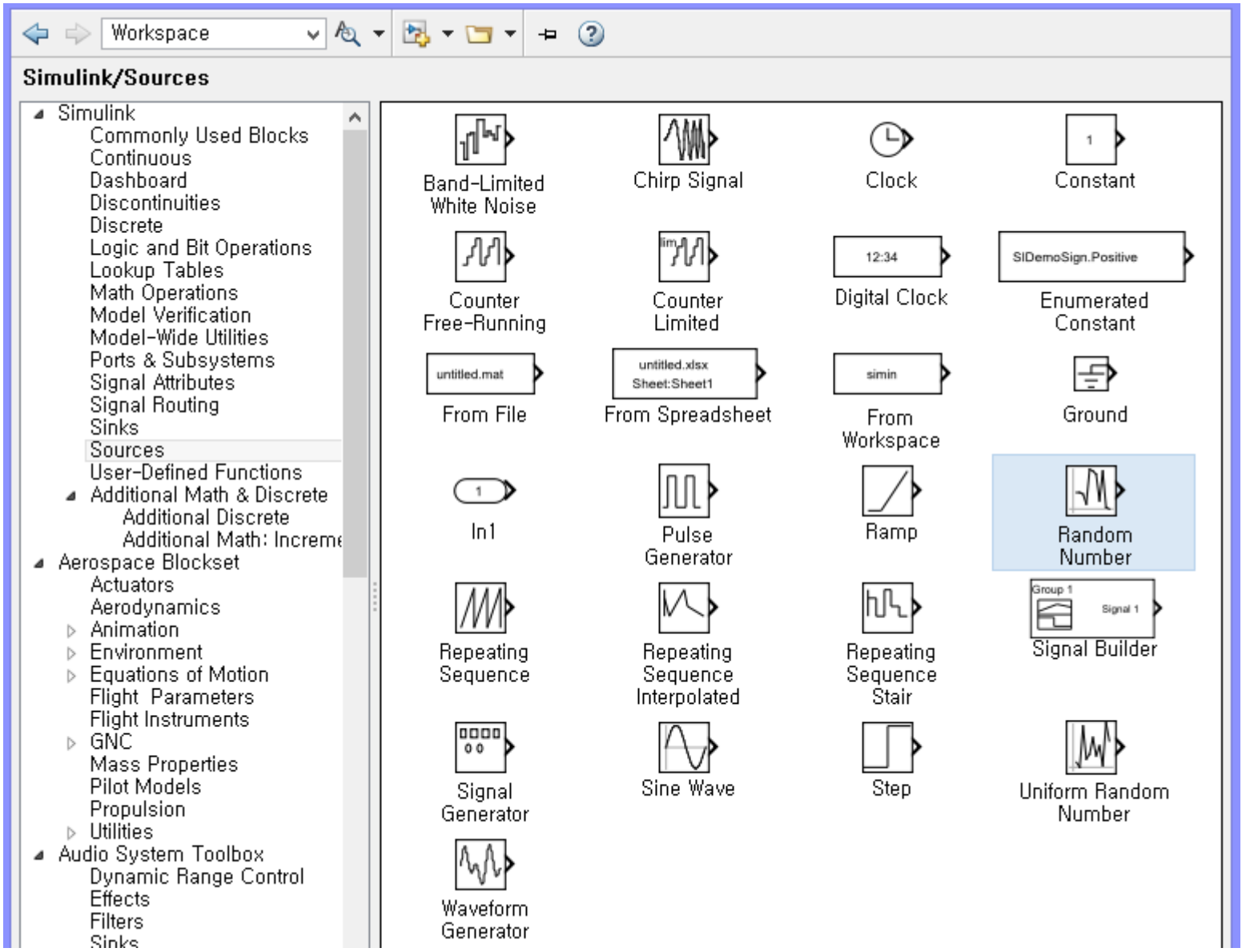

Block Parameters: Kp
Gain
Element-wise gain (y = K.*u) or matrix gain (y = K*u or y = u*K).
Main
Signal Attributes
Parameter Attributes
Gain:
112.69
Multiplication:
Element-wise(K.*u)
OK
Cancel
Help
Apply

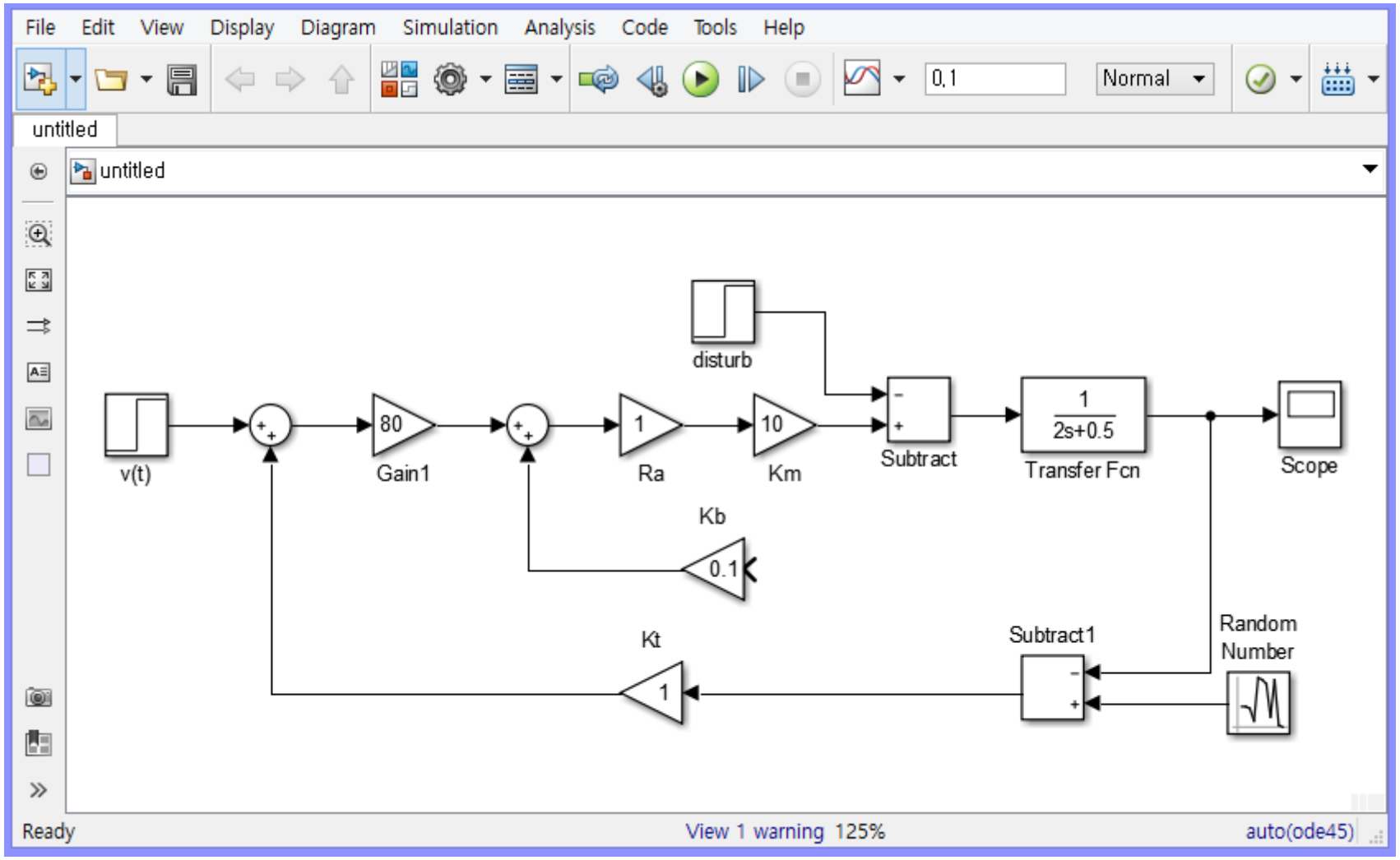

Block Parameters: Ki
Gain
Element-wise gain (y = K.*u) or matrix gain (y = K*u or y = u*K).
Main
Signal Attributes
Parameter Attributes
Gain:
105.57
Multiplication:
Element-wise(K.*u)
OK
Cancel
Help
Apply

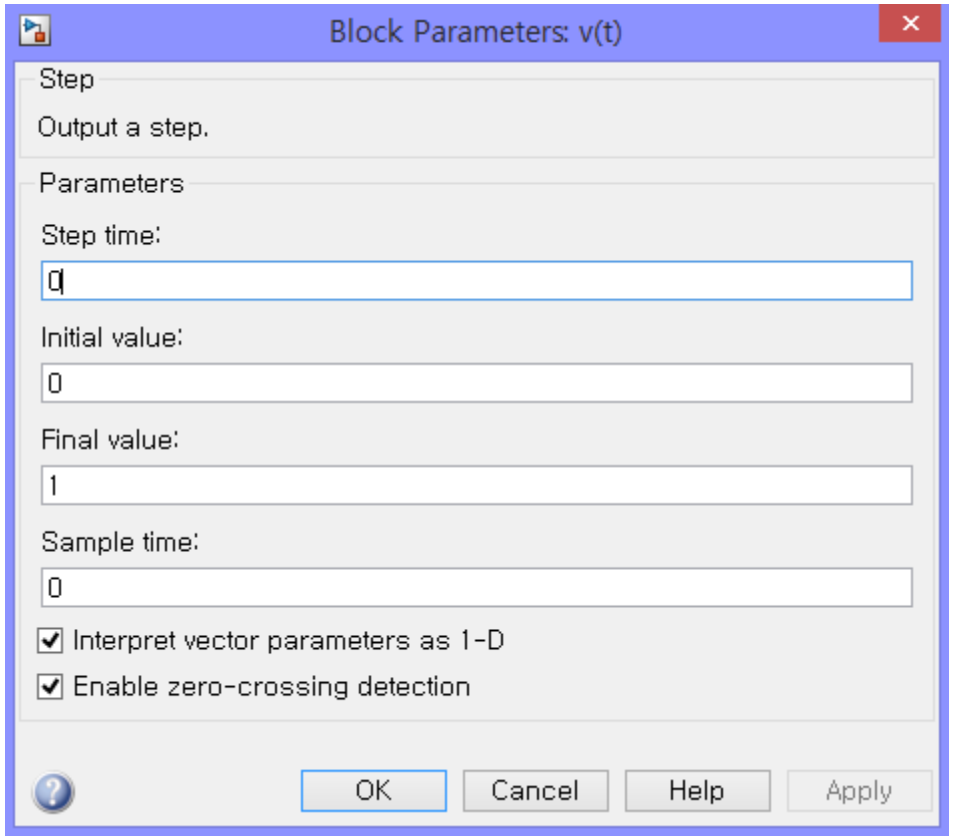

Block Parameters: Kd
Gain
Element-wise gain (y = K.*u) or matrix gain (y = K*u or y = u*K).
Main
Signal Attributes
Parameter Attributes
Gain:
18.32
Multiplication:
Element-wise(K.*u)
OK
Cancel
Help
Apply

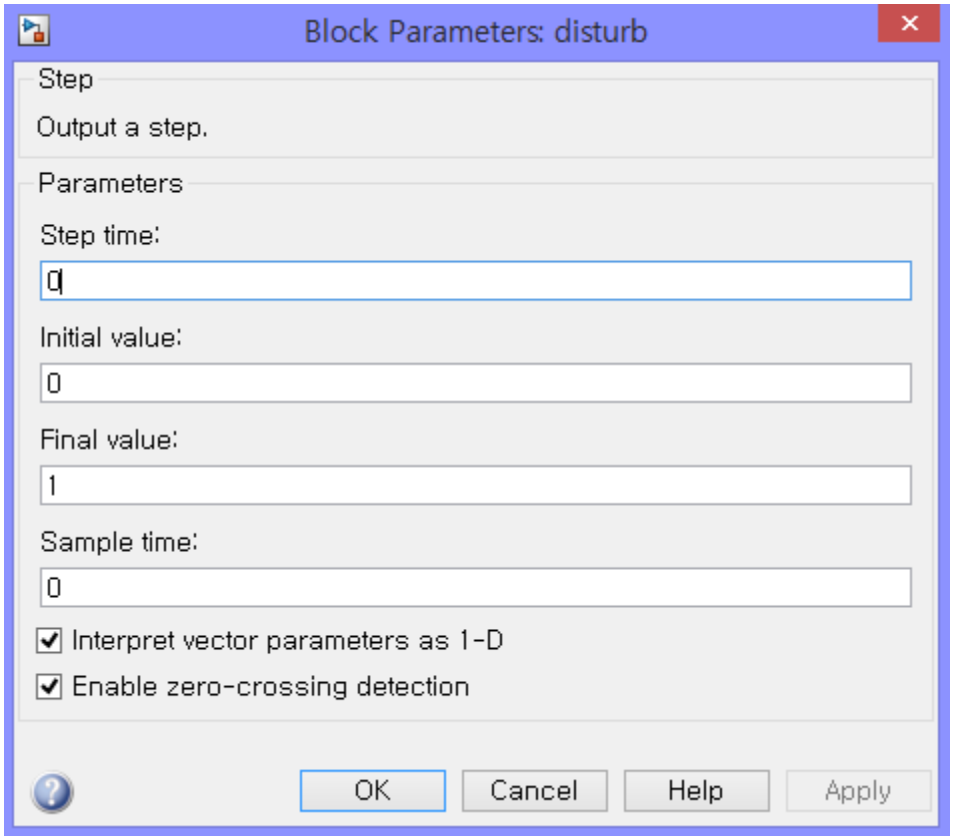

Scope
File
Tools
View
Simulation
Help
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8
9
10
Ready
T=10.000

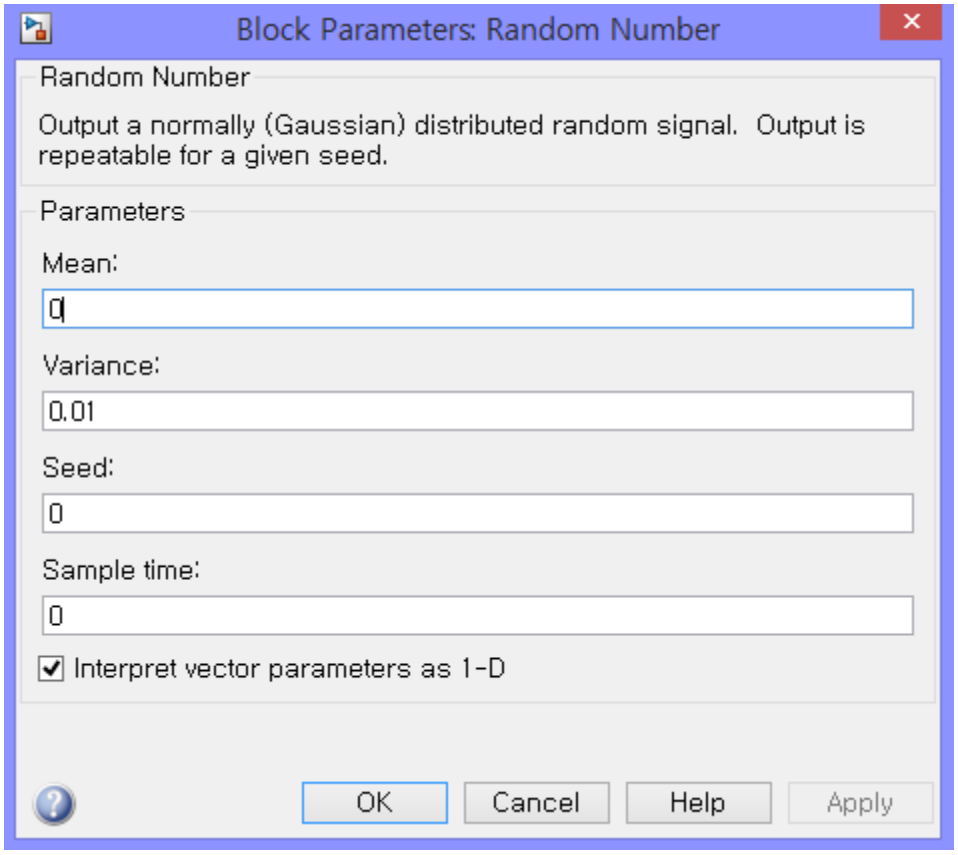

Workspace
Simulink/Math Operations
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
Logic and Bit Operations
Lookup Tables
Math Operations
Model Verification
Model-Wide Utilities
Ports & Subsystems
Signal Attributes
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Additional Discrete
Additional Math: Increme
Aerospace Blockset
Actuators
Aerodynamics
Animation
Environment
Equations of Motion
Flight Parameters
Flight Instruments
GNC
Mass Properties
Pilot Models
Propulsion
Utilities
Audio System Toolbox
Dynamic Range Control
Effects
Filters
Sinks
Sources
Communications System Toolb
Channels
Comm Filters
Comm Sinks
Dot Product
Find Nonzero Elements
Gain
Magnitude-Angle to Complex
Math Function
Matrix Concatenate
MinMax
MinMax Running Resettable
Permute Dimensions
Polynomial
Product
Product of Elements
Real-Imag to Complex
Reciprocal Sqrt
Reshape
Rounding Function
Sign
Signed Sqrt
Sine Wave Function
Slider Gain
Sqrt
Squeeze
Subtract
Sum
Sum of Elements
Trigonometric Function
Unary Minus
Vector Concatenate
Weighted Sample Time Math

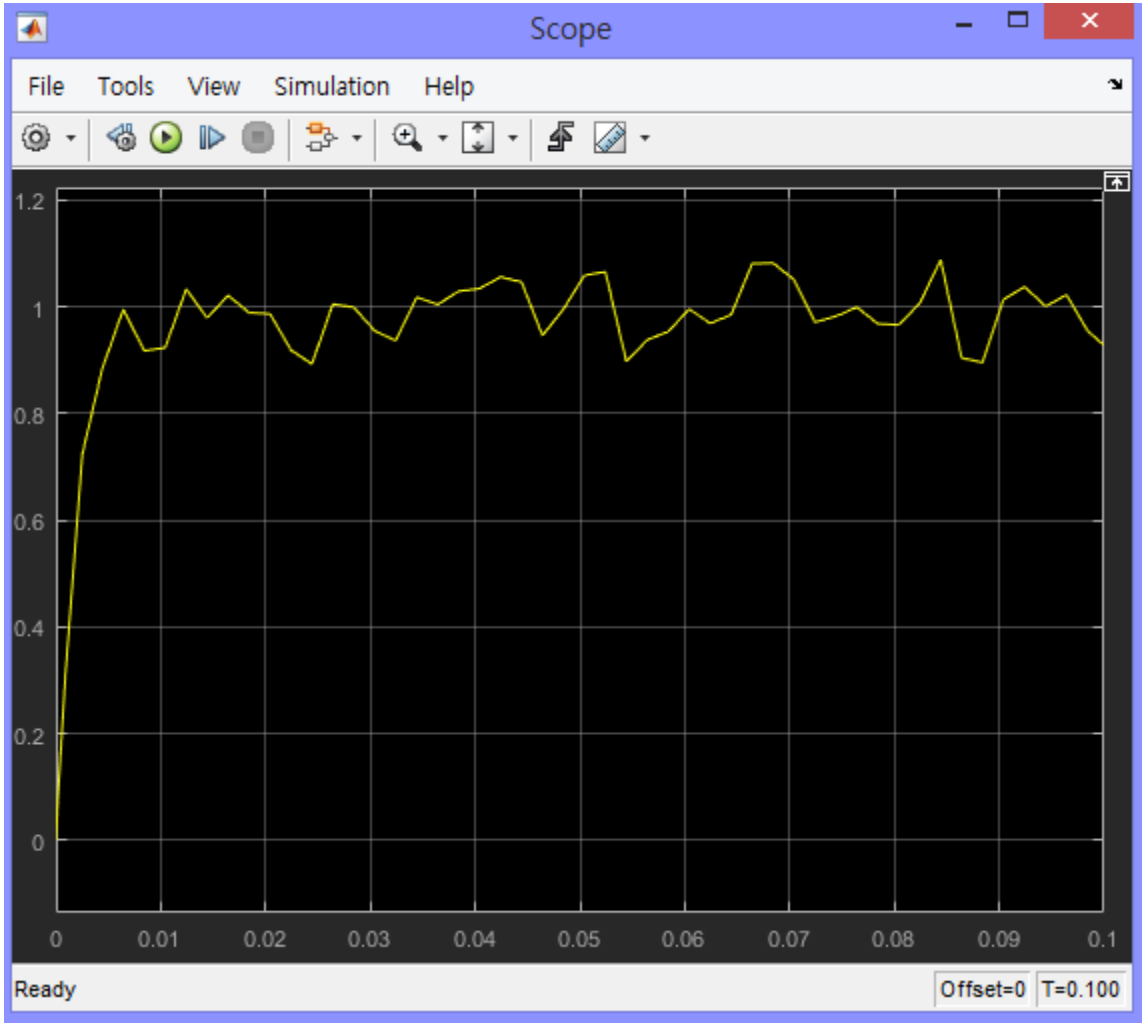

Workspace
Simulink/Sources
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
Logic and Bit Operations
Lookup Tables
Math Operations
Model Verification
Model-Wide Utilities
Ports & Subsystems
Signal Attributes
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Additional Discrete
Additional Math: Increme
Aerospace Blockset
Actuators
Aerodynamics
Animation
Environment
Equations of Motion
Flight Parameters
Flight Instruments
GNC
Mass Properties
Pilot Models
Propulsion
Utilities
Audio System Toolbox
Dynamic Range Control
Effects
Filters
Sinks
Band-Limited White Noise
Chirp Signal
Clock
Constant
Counter Free-Running
Counter Limited
12:34
Digital Clock
SIDemoSign.Positive
Enumerated Constant
untitled.mat
From File
untitled.xlsx
Sheet:Sheet1
From Spreadsheet
simin
From Workspace
Ground
In1
Pulse Generator
Ramp
Random Number
Repeating Sequence
Repeating Sequence Interpolated
Repeating Sequence Stair
Group 1
Signal 1
Signal Builder
Signal Generator
Sine Wave
Step
Uniform Random Number
Waveform Generator


File
Edit
View
Display
Diagram
Simulation
Analysis
Code
Tools
Help
0,1
Normal
untitled
untitled
disturb
v(t)
80
Gain1
1
Ra
10
Km
Subtract
1
2s+0.5
Transfer Fcn
Scope
Kb
0.1
Kt
1
Subtract1
Random
Number
Ready
View 1 warning 125%
auto(ode45)


Block Parameters: v(t)
Step
Output a step.
Parameters
Step time:
0
Initial value:
0
Final value:
1
Sample time:
0
Interpret vector parameters as 1-D
Enable zero-crossing detection
OK
Cancel
Help
Apply


Block Parameters: disturb
Step
Output a step.
Parameters
Step time:
0
Initial value:
0
Final value:
1
Sample time:
0
Interpret vector parameters as 1-D
Enable zero-crossing detection
OK
Cancel
Help
Apply


Block Parameters: Random Number
Random Number
Output a normally (Gaussian) distributed random signal. Output is repeatable for a given seed.
Parameters
Mean:
0
Variance:
0.01
Seed:
0
Sample time:
0
Interpret vector parameters as 1-D
OK
Cancel
Help
Apply


Scope
File
Tools
View
Simulation
Help
1.2
1
0.8
0.6
0.4
0.2
0
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
Ready
Offset=0
T=0.100