



石家莊鐵道大學  
SHIJIAZHUANG TIEDAO UNIVERSITY

在线开放课程

控制系统matlab计算与仿真

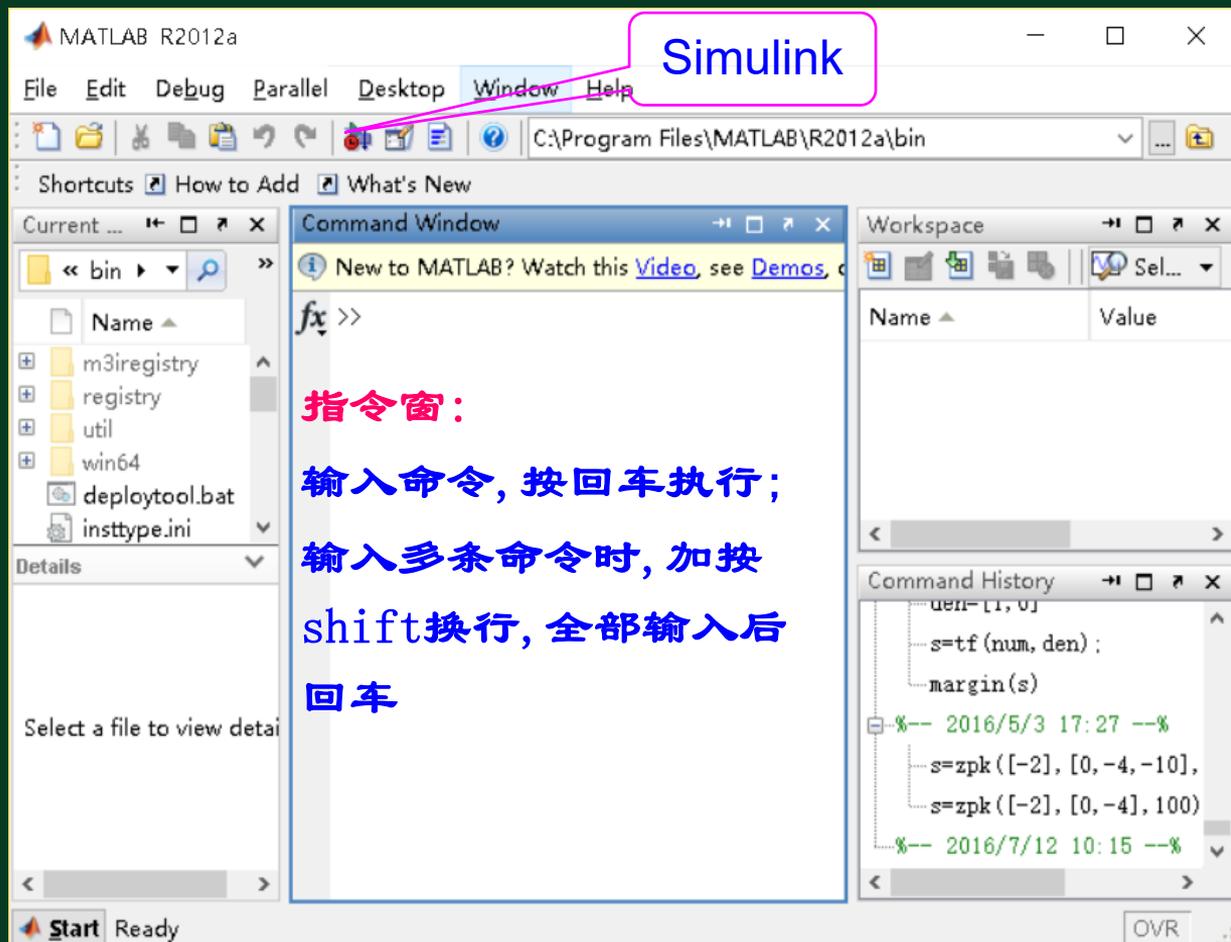
利用Simulink对系统建模与仿真

主讲：刘希太

# ◆ matlab简介

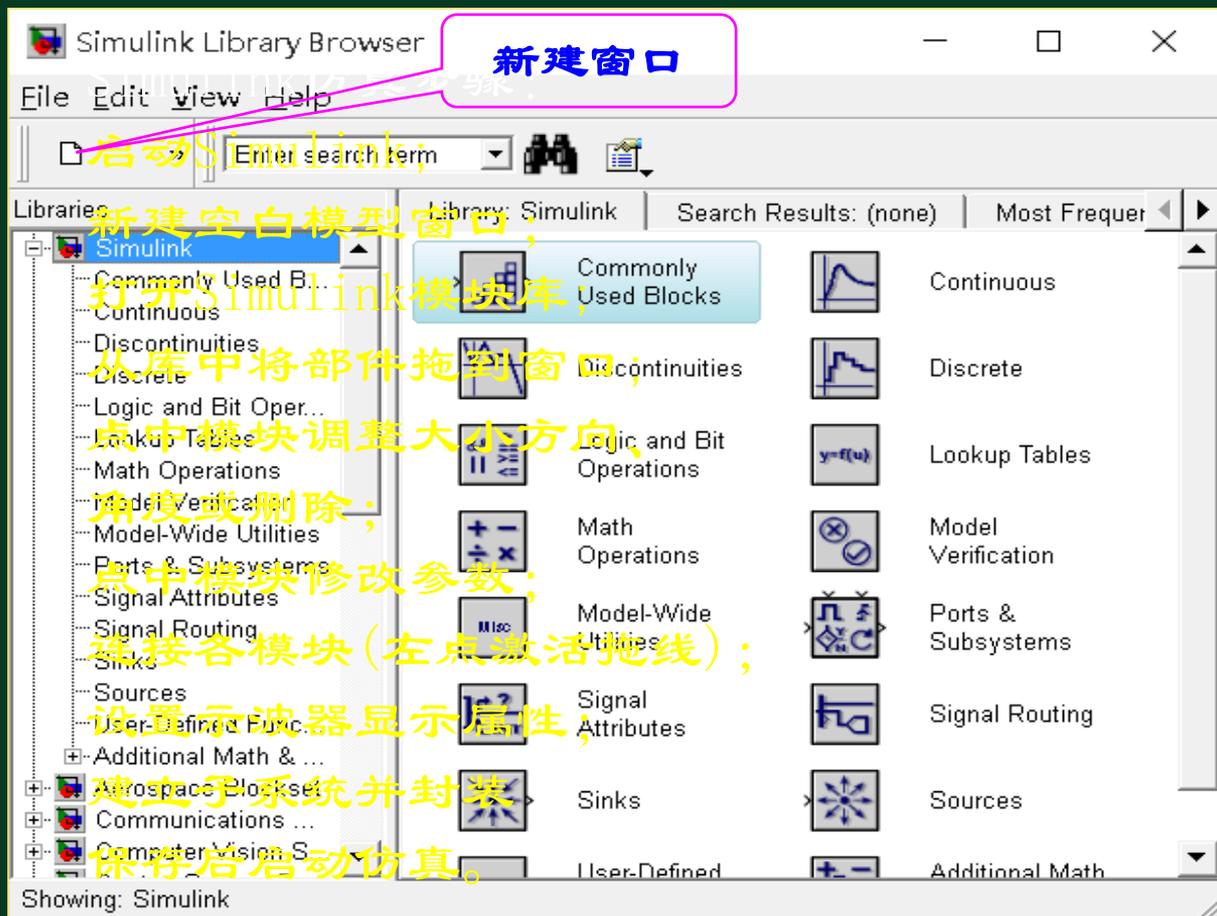
Matlab——粉丝有的称其为小麦

- 1980年前后，美国moler博士构思并开发。
- 最初版本用fortran，现用c语言，每年都在更新。
- 可完成控制系统复杂计算、分析和作图。
- 编写程序简单得不要不要的。
- 小麦功能强大，现只学与控制有关的内容。



The image shows the MATLAB R2012a Simulink interface. The title bar reads "MATLAB R2012a" and "Simulink". The menu bar includes "File", "Edit", "Debug", "Parallel", "Desktop", "Window", and "Help". The toolbar contains various icons for file operations and simulation. The main workspace is currently empty. The Command Window is active, showing the prompt `fx >>`. The Command History window shows a list of commands: `den=[1,0]`, `s=tf(num,den);`, `margin(s)`, `s=zpk([-2],[0,-4,-10],`, and `s=zpk([-2],[0,-4],100)`. The Command History window also displays timestamps: `2016/5/3 17:27` and `2016/7/12 10:15`.

**指令窗：**  
**输入命令，按回车执行；**  
**输入多条命令时，加按**  
**shift换行，全部输入后**  
**回车**

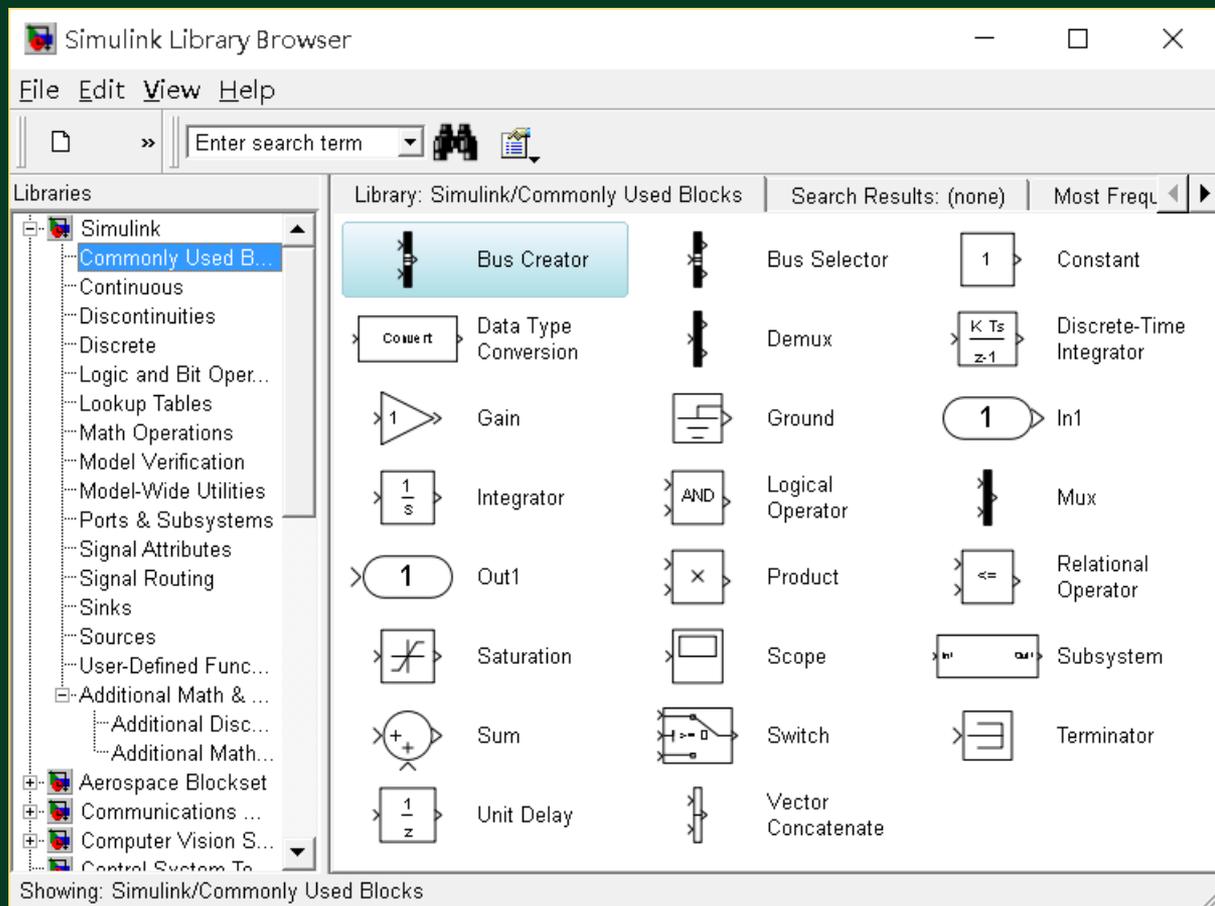


The screenshot shows the Simulink Library Browser interface. A pink box highlights the '新建窗口' (New Window) button in the title bar. A yellow box highlights the '启动 Simulink' (Start Simulink) button in the toolbar. The main area displays a tree view of libraries on the left and a list of blocks on the right. Annotations in yellow text provide instructions for each step.

**新建空白模型窗口，**  
**打开 Simulink 模块库，**  
**从库中将部件拖到窗口，**  
**点击模块调整大小方向，**  
**角度或删除；**  
**点击模块修改参数；**  
**连接各模块（左点激活拖线）；**  
**设置示波器显示属性；**  
**建立子系统并封装；**  
**保存后启动仿真。**

Showing: Simulink

# ◆ Simulink通用模块



Simulink Library Browser

File Edit View Help

Enter search term

Libraries

- Simulink
  - Commonly Used B...
  - Continuous
  - Discontinuities
  - Discrete
  - Logic and Bit Oper...
  - Lookup Tables
  - Math Operations
  - Model Verification
  - Model-Wide Utilities
  - Ports & Subsystems
  - Signal Attributes
  - Signal Routing
  - Sinks
  - Sources
  - User-Defined Func...
  - Additional Math & ...
    - Additional Disc...
    - Additional Math...
  - Aerospace Blockset
  - Communications ...
  - Computer Vision S...
  - Control System To...

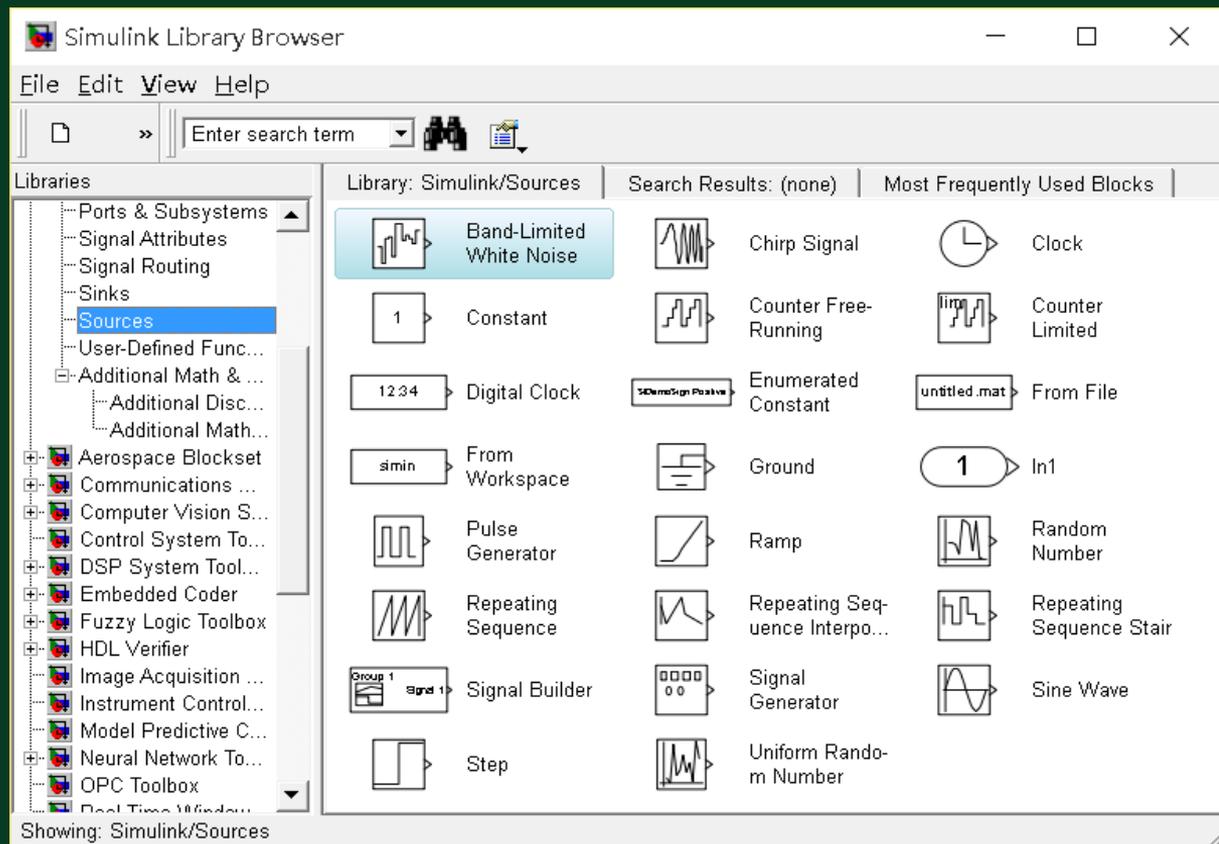
Library: Simulink/Commonly Used Blocks | Search Results: (none) | Most Freq

	Bus Creator		Bus Selector		Constant
	Data Type Conversion		Demux		Discrete-Time Integrator
	Gain		Ground		In1
	Integrator		Logical Operator		Mux
	Out1		Product		Relational Operator
	Saturation		Scope		Subsystem
	Sum		Switch		Terminator
	Unit Delay		Vector Concatenate		

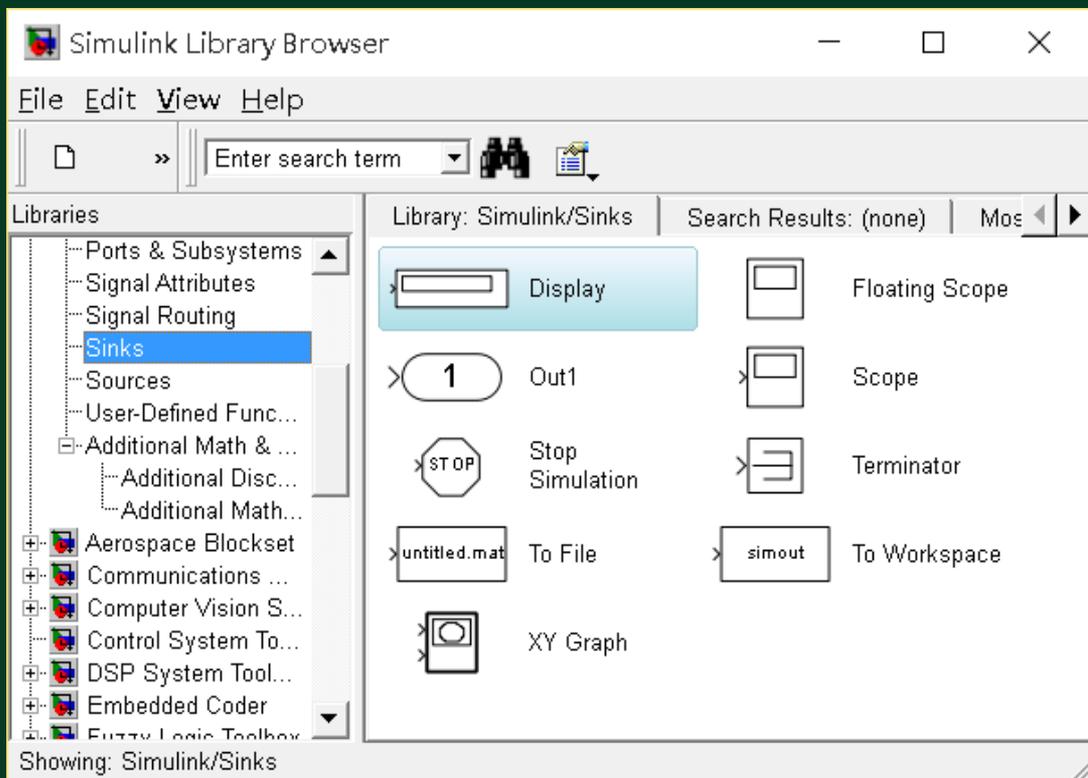
Showing: Simulink/Commonly Used Blocks

# ◆ Simulink通用信号源

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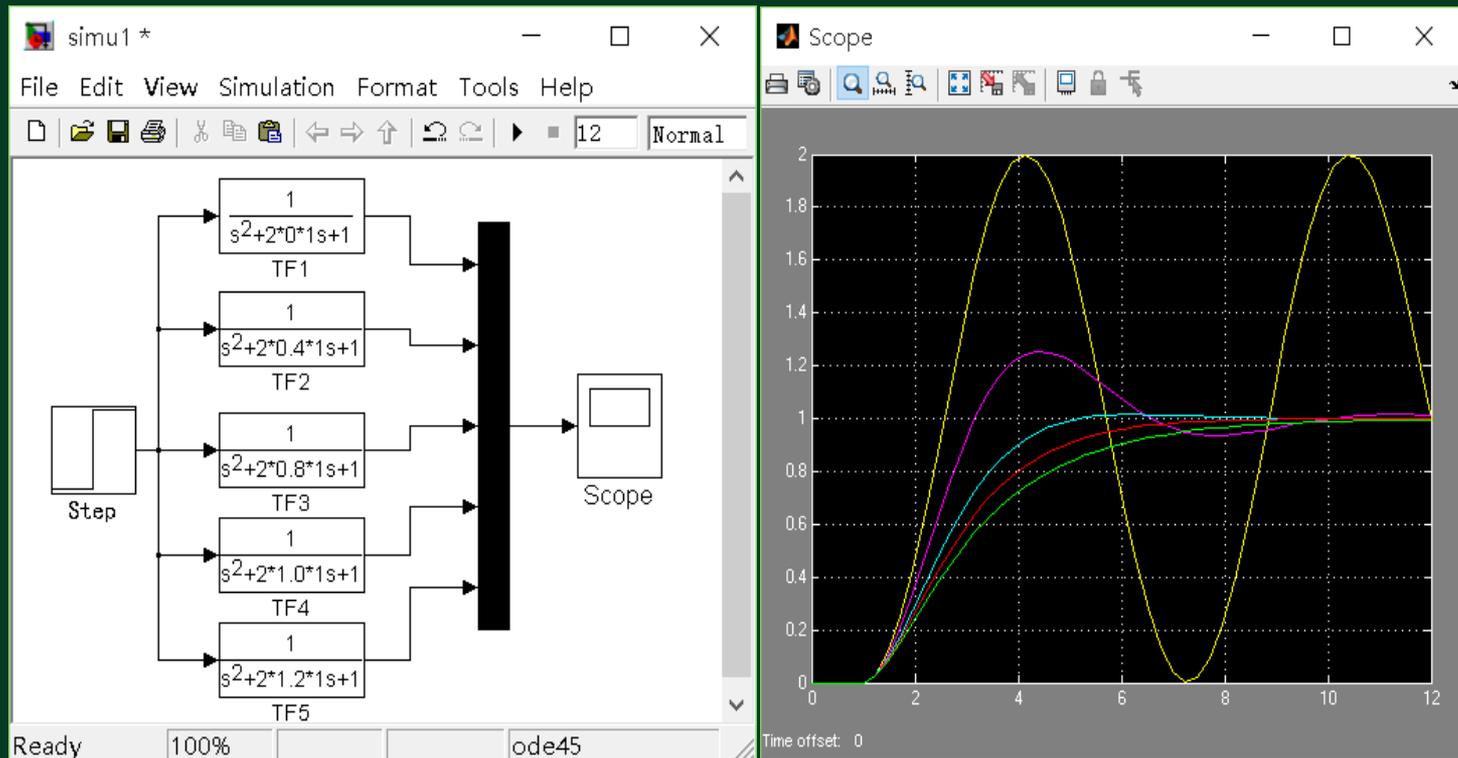


# ◆ Simulink通用接收模块



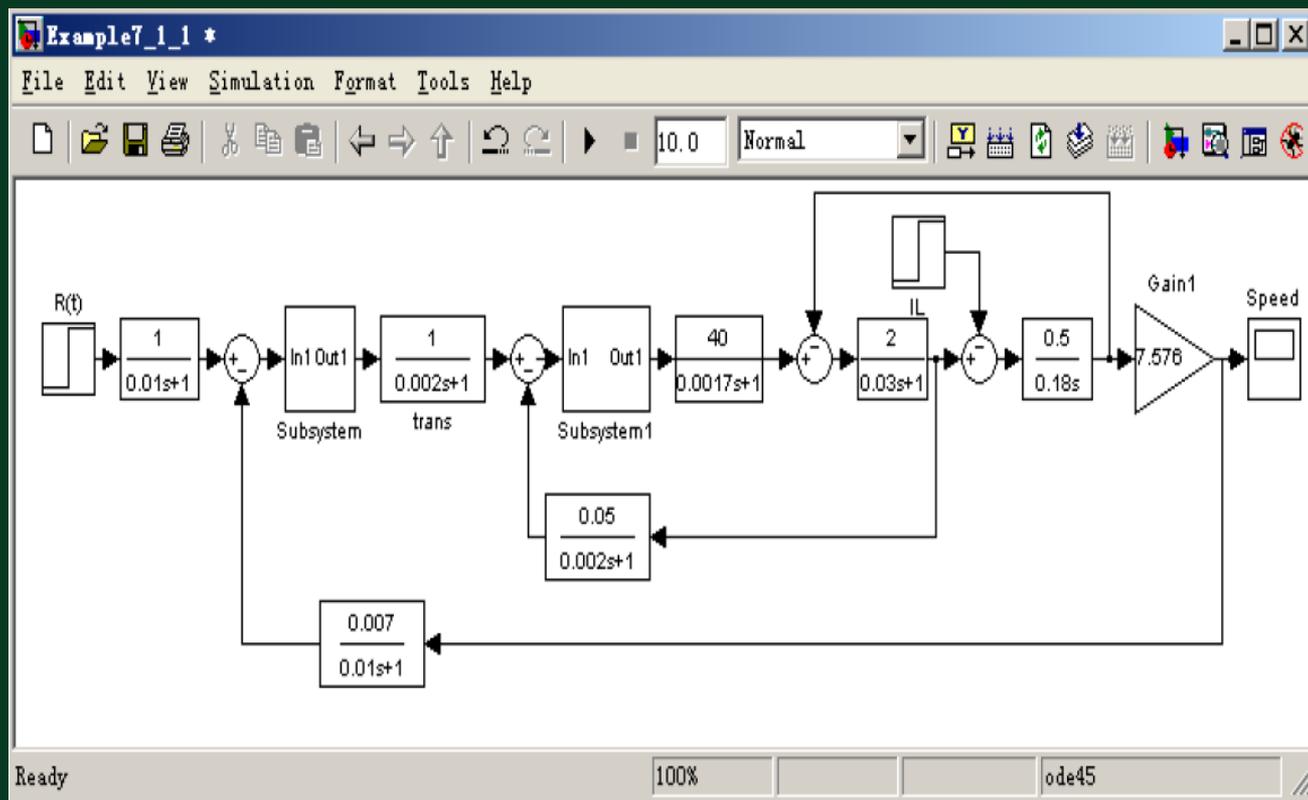
# ◆ 示例1: 二阶系统阶跃响应

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运行后双击scope

# ◆ 示例2: 直流双闭环调速系统



## 小结

可直接在Simulink环境中运作的工具包很多，覆盖通信、控制、信号处理、DSP、电力系统等诸多领域，可将复杂问题轻松处理。