EE160 Control Theory

Lab 1 MATLAB and Simulink Fundamentals

Objectives

1. Master the basic use of MATLAB. Understand the common build-in functions used for control theory.
2. Be familiar with Simulink basic modules. Be able to use simulink to build simulation systems.

MATLAB Fundamentals

MATLAB (Matrix Laboratory) has powerful matrix computation capabilities and excellent graphical visualization functions, and has a wide range of applications in signal processing, image processing, control systems and neural networks.

MATLAB offers many specialized toolboxes, such as the **Control System Toolbox** and the **Signal Processing Toolbox**. The Control System Toolbox primarily consists of a collection of functions that apply classical control theory to handle linear time-invariant (LTI) systems, providing a comprehensive solution for modeling, analyzing, and designing LTI systems. To complete the software simulation for this course, please install the aforementioned two toolboxes.

Please refer to the *Matlab for Control.pdf* for basic usage of MATLAB.

Simulink Fundamantals

Simulink is a dynamic simulation integrated environment provided by MATLAB, which is an extension of MATLAB. It offers a platform for building dynamic system models using graphical blocks. You can start Simulink by entering the command *simulink* in the command line or by clicking the *Simulink* button in the home menu.

```
1    simulink    % start Simulink
```

Figure 1: Start Simulink

After start Simulink, create a blank model, as shown in 2.

Figure 2: Create a Blank Model

After entering the model interface, open the library browser, drag and drop the required modules to build the simulation system, as shown in 3.

The modules used in this course are mainly concentrated in the Simulink directory. Categories such as **Continuous Systems**, **Math Operations**, **Sinks**, and **Sources** are the most commonly used. After selecting a category, the corresponding modules will appear in the module library on the right side. Drag the required modules to the model interface and add connections between the modules to complete the construction of the simulation model.

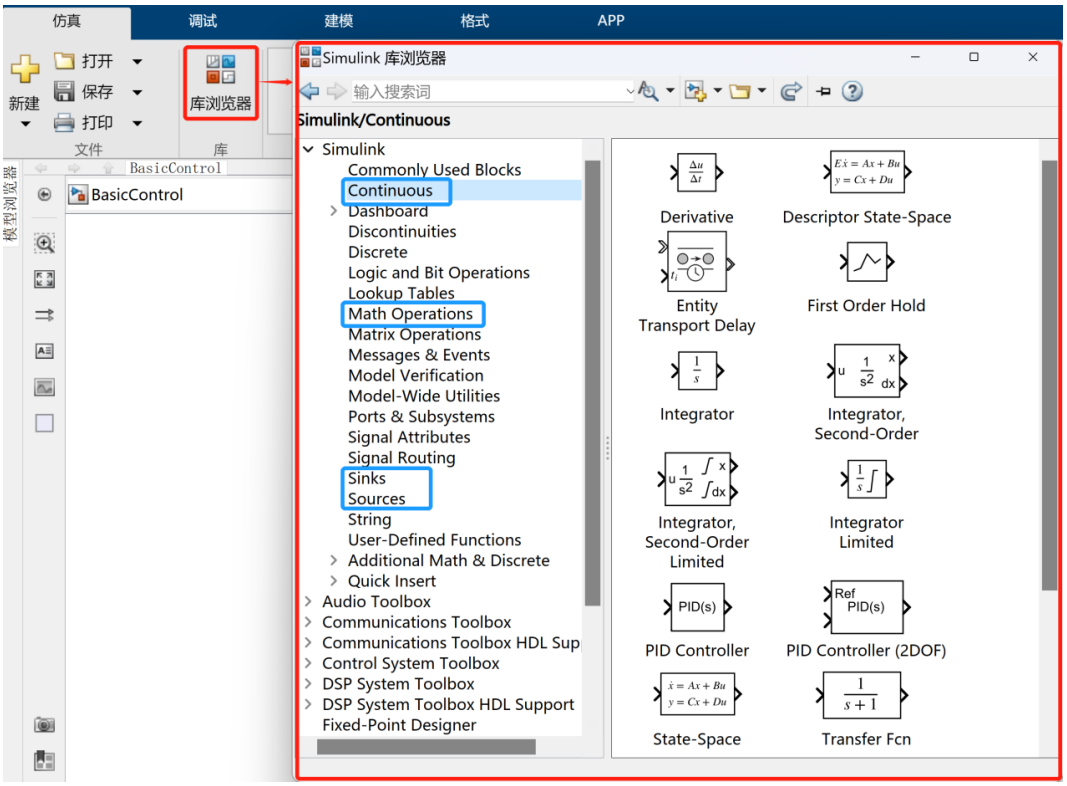

Figure 3: Simulate with Library Modules

A simulation model is shown in 4.

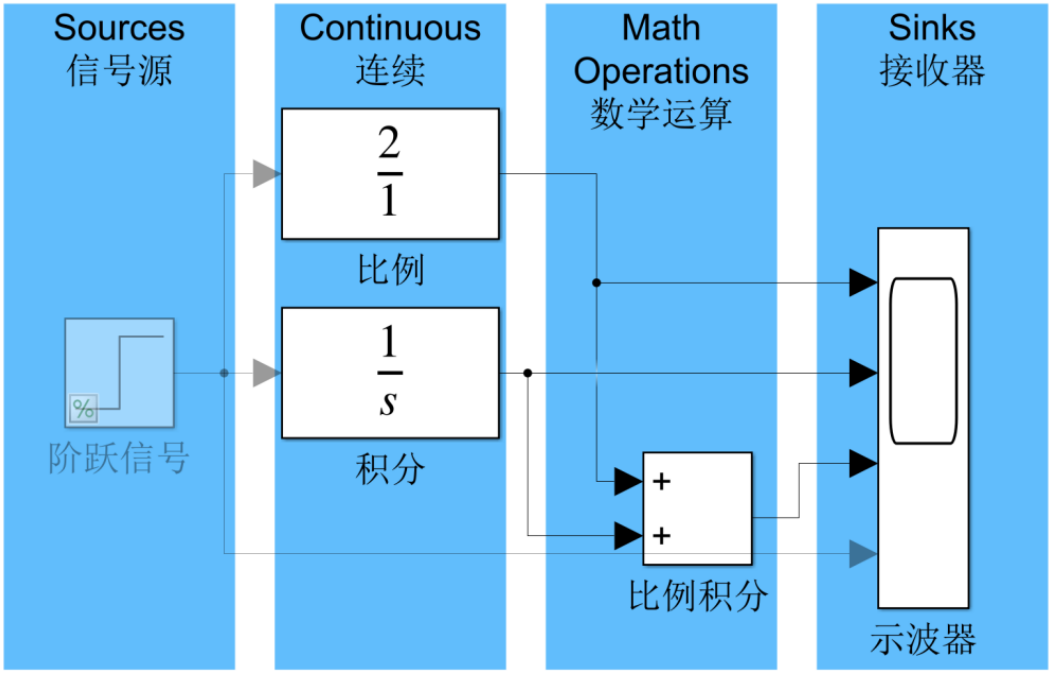

Figure 4: A Simulation Model