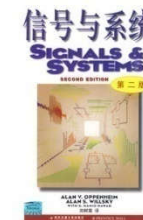




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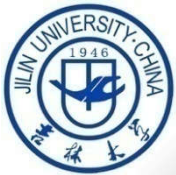


Signals and Systems

暑期实践 2022

5. Simulink仿真系统分析与设计

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时间安排

Mon AM (a) 系统的时域特性和频率特性

Mon PM 实践 3-4 验收

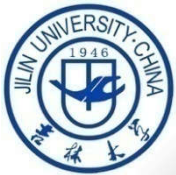
Tue AM (b) 调制解调, (c) 反馈使系统稳定

Tue PM ——

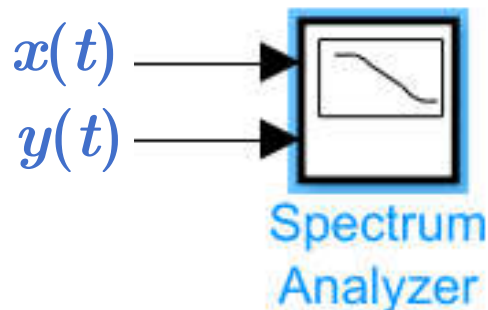
Wed AM ——

Wed PM 实践 5 验收





Blocks 1. Spectrum Analyzer 频谱分析仪



$$H(j\omega) = \frac{Y(j\omega)}{X(j\omega)}$$

双击:

Block Parameters: Spectrum Analyzer

Spectrum Analyzer (mask) (link)

Implements a Spectrum Analyzer.
Hook input 1 to system input.
Hook input 2 to system output.

Parameters

Length of buffer:

Number of points for fft:

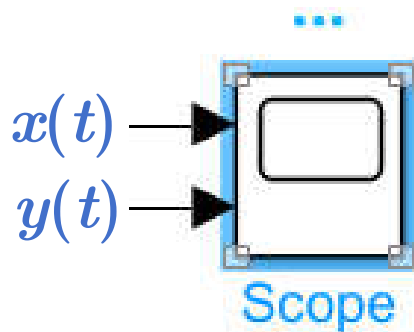
Plot after how many points:

Sample time:

OK Cancel Help Apply

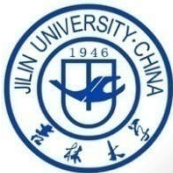


Blocks: 2. Scope 示波器



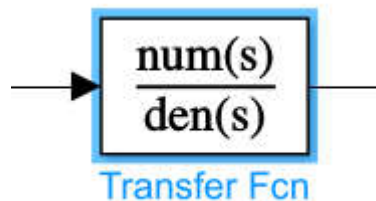
A context menu is displayed over the Scope block. The menu contains the following items:

- Explore
- Open
- Cut (Ctrl+X)
- Copy (Ctrl+C)
- Paste (Ctrl+V)
- Comment Through (Ctrl+Shift+Y)
- Comment Out (Ctrl+Shift+X)
- Uncomment
- Delete (Del)
- Create Subsystem from Selection (Ctrl+G)
- Observers
- Format
- Rotate & Flip
- Arrange
- Mask
- Library Link
- Signals & Ports** (highlighted)
 - Number of Input Ports (highlighted)
 - Input Port Signal Properties
 - Output Port Signal Properties
- Requirements
- Coverage

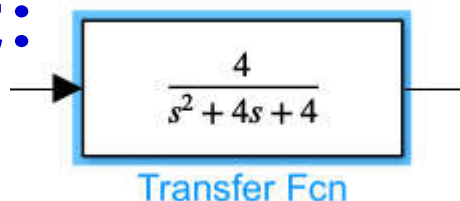


Blocks: 3. Transfer Fcn 传递函数

双击:



拉宽:



`>>freqs(4,[1 4 4])`

右击 — Linear Analysis — Linearize Block

仅供验证频谱分析仪结果用

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.

'Parameter tunability' controls the runtime tunability level for numerator and denominator coefficients.

'Auto': Allow Simulink to choose the most appropriate tunability level.

'Optimized': Tunability is optimized for performance.

'Unconstrained': Tunability is unconstrained across the simulation targets.

Parameters

Numerator coefficients:

[4]

Denominator coefficients:

[1 4 4]

Parameter tunability: Auto

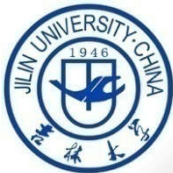
Absolute tolerance:

auto

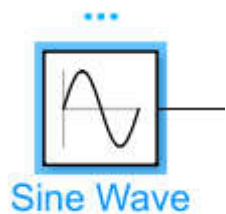
State Name: (e.g., 'position')

''

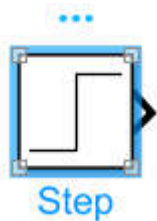
OK Cancel Help Apply



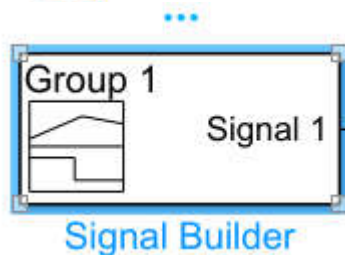
Blocks: 4. Sources 信号源



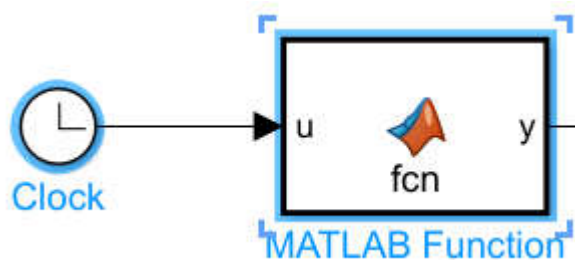
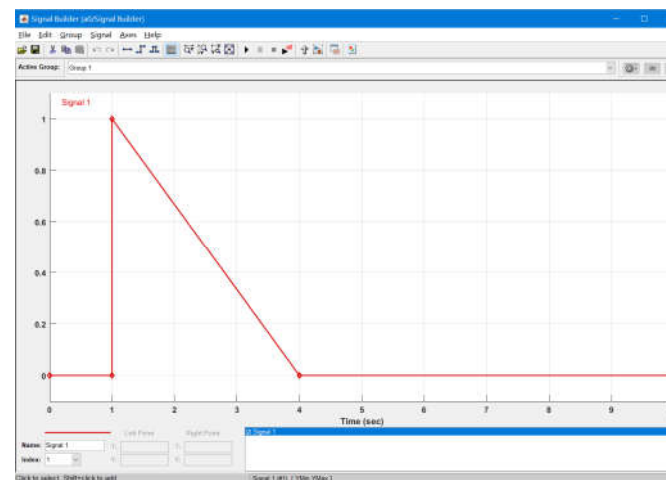
单频信号



阶跃信号、矩形脉冲

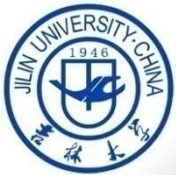


任意形状
shift click 加点

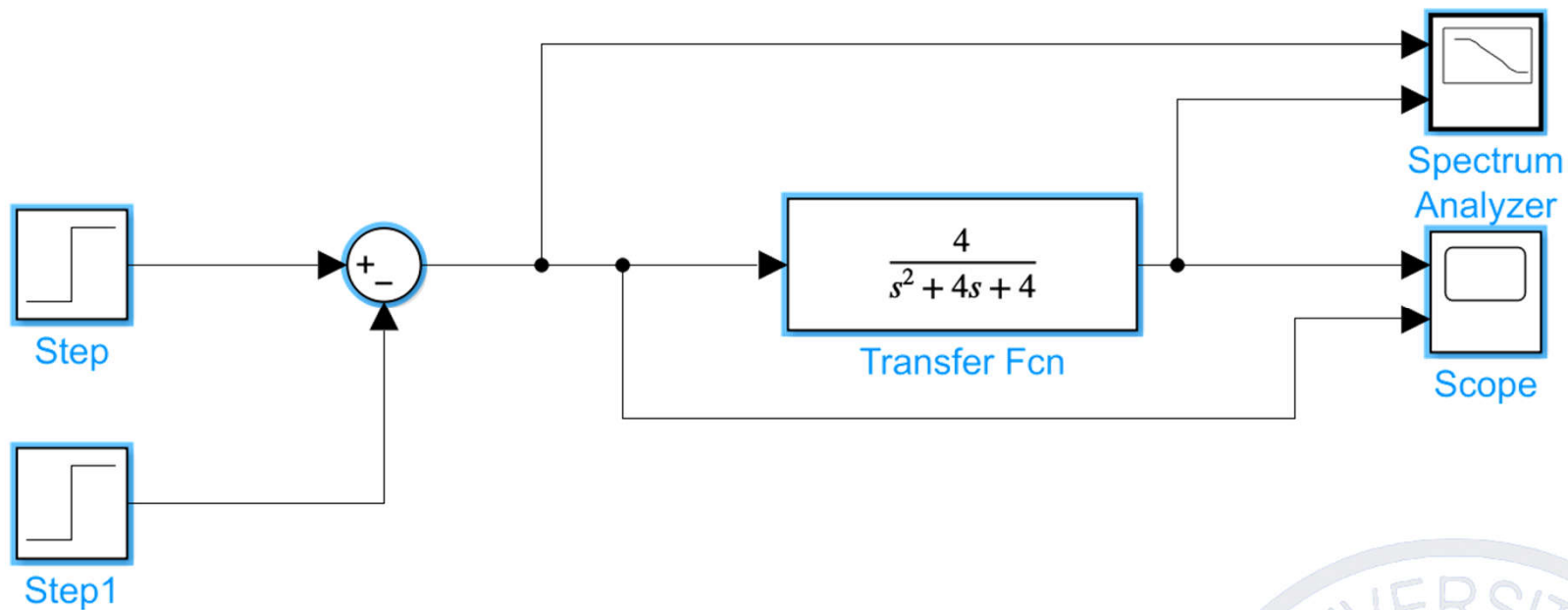


$$e^{-t}u(t)$$

```
function y = fcn(u)
    %#codegen
    y = exp(-u);
```

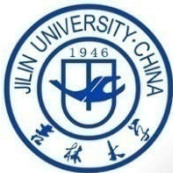


时域特性 $h(t)$, $s(t)$

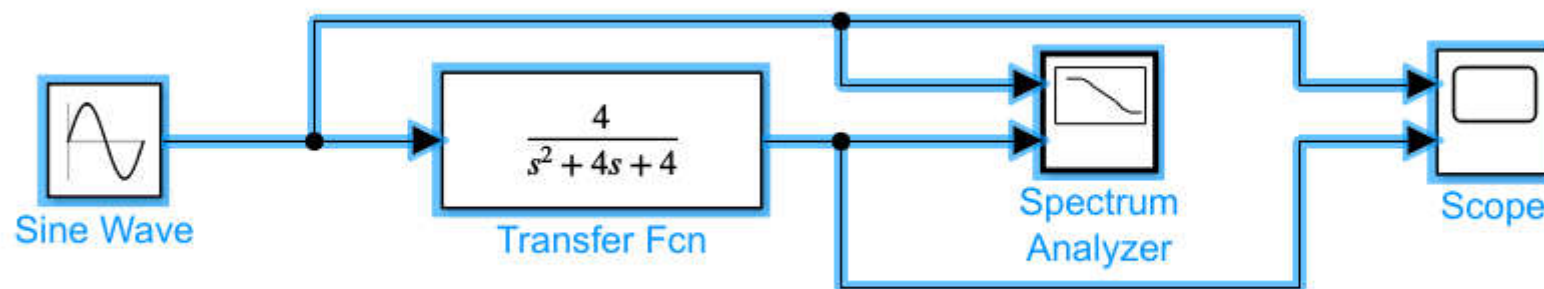


- (1) 如何模拟单位冲击函数 $\delta(t)$?
- (2) 观察阶跃响应





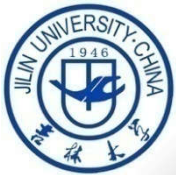
频域特性 $H(j\omega)$



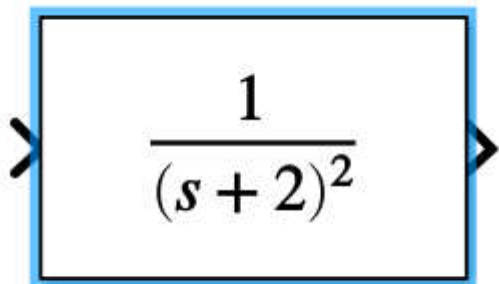
用单频信号无法得到整个频带的频谱

- (1) 观察频谱分析仪输出
- (2) 缩短缓冲区长度，观察输出
- (3) 试换用其它信号源，观察输出





零极点: Zero-Pole 代替 Transfer Fcn

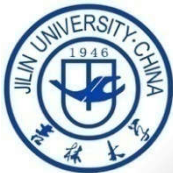


Zero-Pole

改变零极点位置

- (1) 观察阶跃响应
- (2) 观察频率响应





添加足够的注释

双击背景，再右击光标，”Create Annotation”，右击， format — shadow

在实际测量过程中，测量系统特性影响测量结果，因为测量结果等于被测量物理量的真值与测量系统单位冲激响应（特别是前端传感器特性）的卷积，测试测量系统的时域、频域特性对精准测量具有重要意义。具体要求：利用simulink仿真设计搭建一阶或二阶测量系统（测量系统通过查找资料自行确定），设计测试系统方案，至少采用2种方法，测试测量系统的时域特性和频率特性；研究系统零极点参数对测量系统的上升时间以及系统带宽的影响。

