Lab 8

EE 324: Signals and Systems II

In this lab section we will explore the relations between discrete-time systems and continuous-time systems.

1 Prelab assignment

1. Get familiar with the zero-order hold (ZOH) block in simulink https://www.mathworks.com/help/simulink/slref/zeroorderhold.html?s_tid=gn_loc_drop

2. Learn how to generate discrete time Sine wave in simulink https://www.mathworks.com/help/dsp/ref/sinewave.html

3. Discretizing the following system using $s = \frac{1}{T}(z-1)$ with sample period T = 1, 0.1, 0.01

$$H(s) = \frac{900}{s^2 + 2s + 900} \tag{1}$$

4. Discretizing H(s) using $s = \frac{2}{T} \frac{z-1}{z+1}$ with sample period T = 1, 0.1, 0.01

5. Discretizing H(s) using ZOH method with sample period T = 1, 0.1, 0.01

2 Lab assignment

1. Verify your results in Prelab problem 5 using matlab function d2c.

2. Realize the discrete-time systems obtained in Prelab problems 3-5 in simulink.

3. Compare the responses of these three systems for all the sample period T = 1, 0.1, 0.01. You can choose the input to be a discrete-time Sine wave or Band-Limited White Noise or any other signal you like. Describe your observations.

4. Build a discrete-time system through a cascade connection of a zero-order hold and H(s), as shown in the figure below.

5. Compare the responses of the systems in Lab problem 4 and Prelab problem 5 for all the sample period T = 1, 0.1, 0.01. Describe your observations.

