

ECE-420: Discrete-Time Control Systems

Project Part A State: Simulating a Plant

Due: At the beginning of class Friday September 26th (e-mail me a memo)

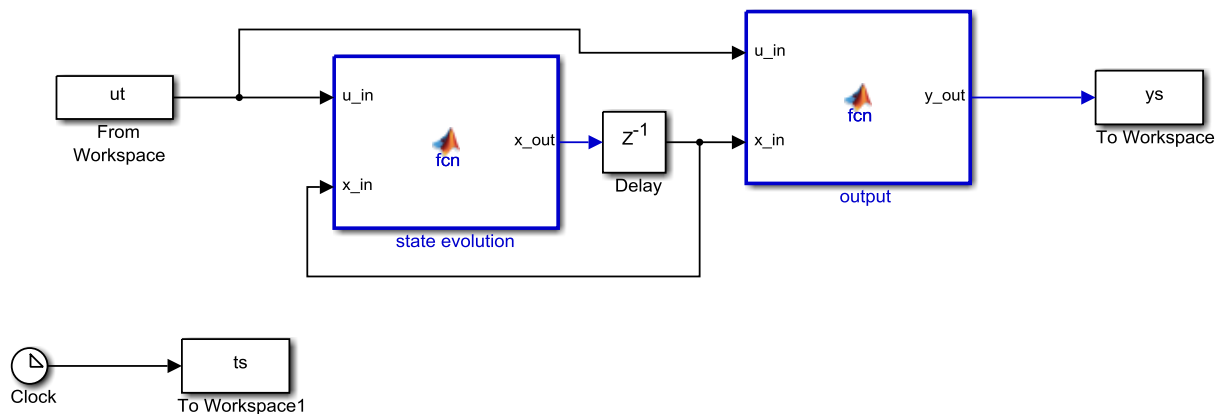
In this part of the project you will simulate a discrete-time state variable system in both Matlab and Simulink. You will need to download the project files from the class website for this. This project was written for Matlab R2012b with a 64 bit operating system. You should start project early so you can get the system all working. *You should start with the files you used on Part A, copy them, then modify them.*

Mathematical Background: Consider a simple discrete-time state variable model

$$x(n+1) = Gx(n) + Hu(n)$$

$$y(n) = Cx(n) + Du(n)$$

The file **openloop_state_driver.m** simulates a discrete-time state variable system in Matlab, and invokes a Simulink **model openloop_state_model.mdl**. You are to create this Simulink model file, and it should look like the following:



The variables n and m should be parameters, and all of your arrays (G , H , C , D) should also be parameters and dimensioned using these variables (don't hard-code the sizes). You will also need to set the dimensions for u_in , x_in , x_out and y_out . The code within the functions is very simple. You should end up with a graph that looks like Figure 1 (see next page).

To turn in: write a short memo including your graphs (with captions and figure numbers), and any suggestions you may have for improving this part of the project. e-mail me your memo.

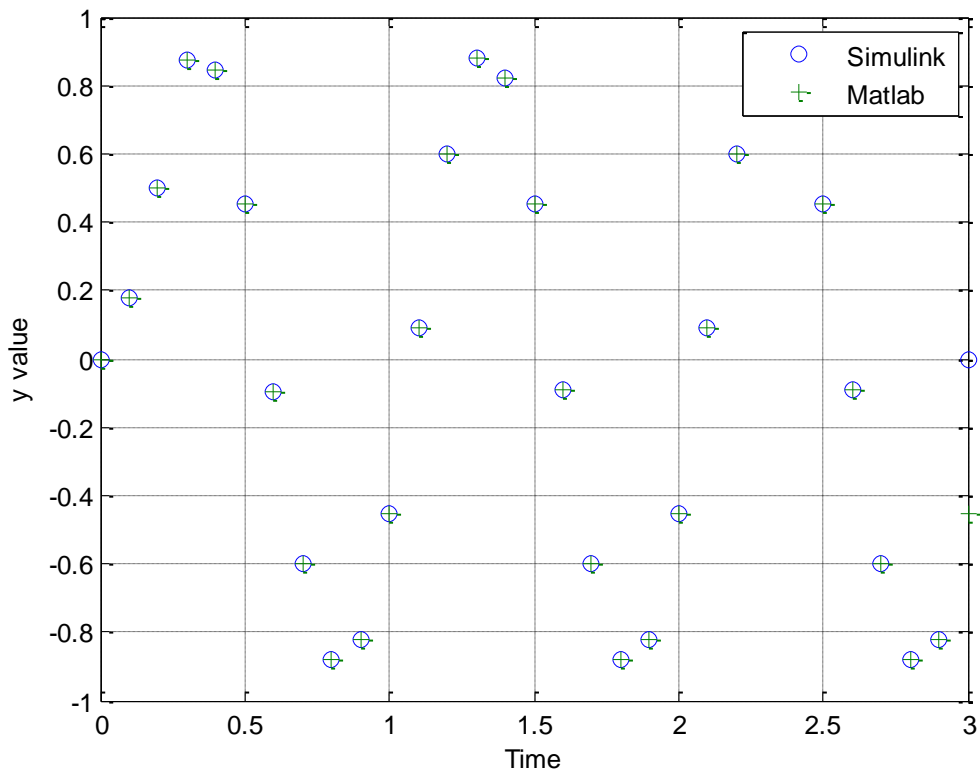


Figure 1. Results of the Matlab and Simulink simulations.