

Experiment No. 7

Aim: (a). Study of time response of 2nd Order System using Proportional (P) Controller.

(b). Study of time response of 2nd Order System using Proportional-Integral (PI) Controller.

Objective: To Plot Step Response and compare Open Loop System with Closed Loop P and PI Controller for 2nd order system (mass-spring-damper system) using Simulink.

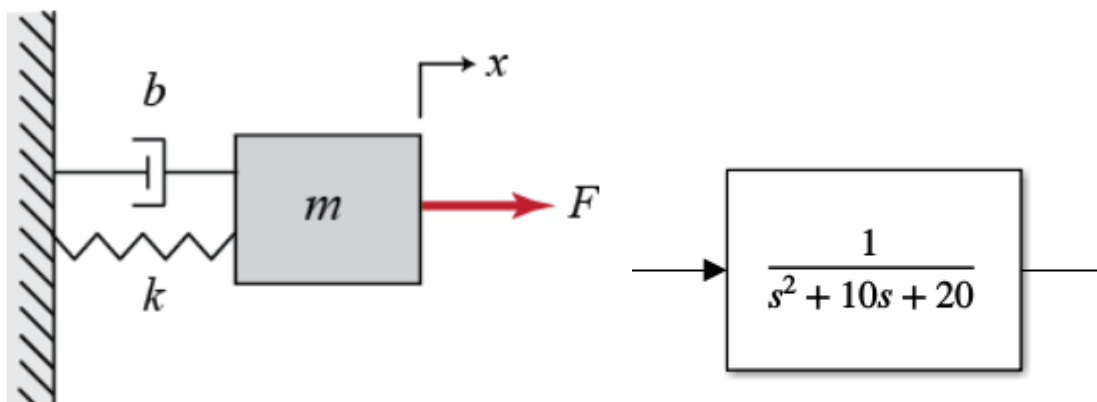


Fig.1: 2nd order system (spring-mass-damper system)

Fig.2: System Transfer Function

MATLAB/Simulink Models:

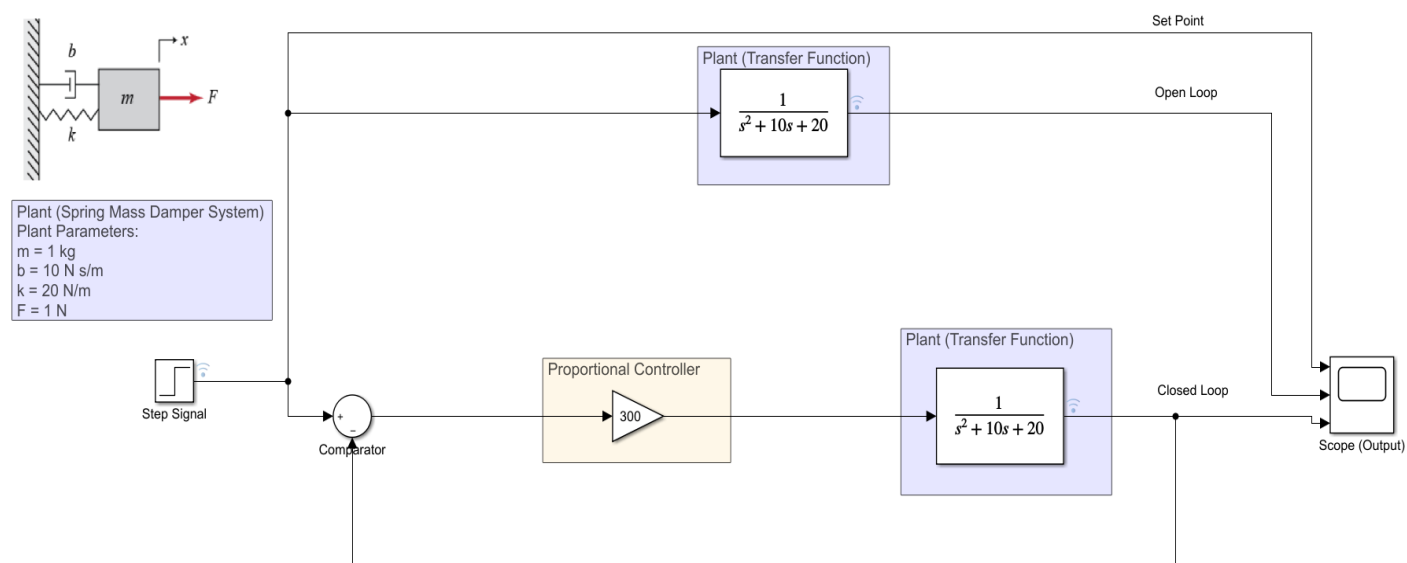


Fig.3: Simulink model of closed loop P controller with 2nd order system.

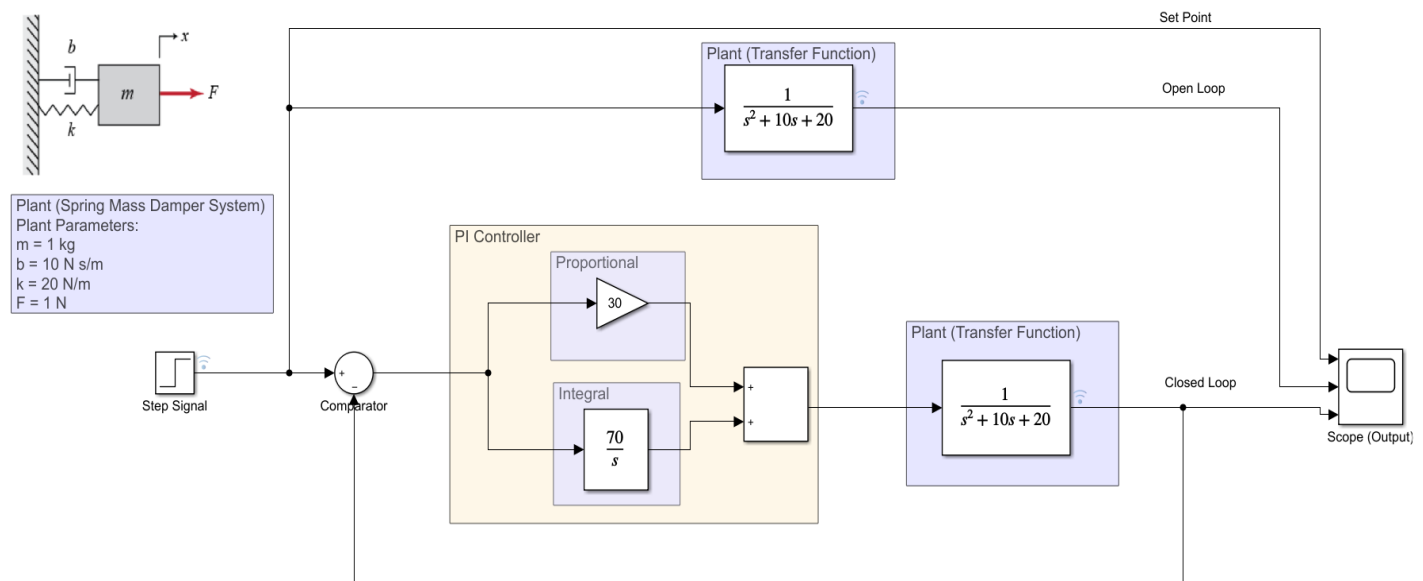


Fig.4: Simulink model of closed loop P-I controller with 2nd order system.

Expected Results:

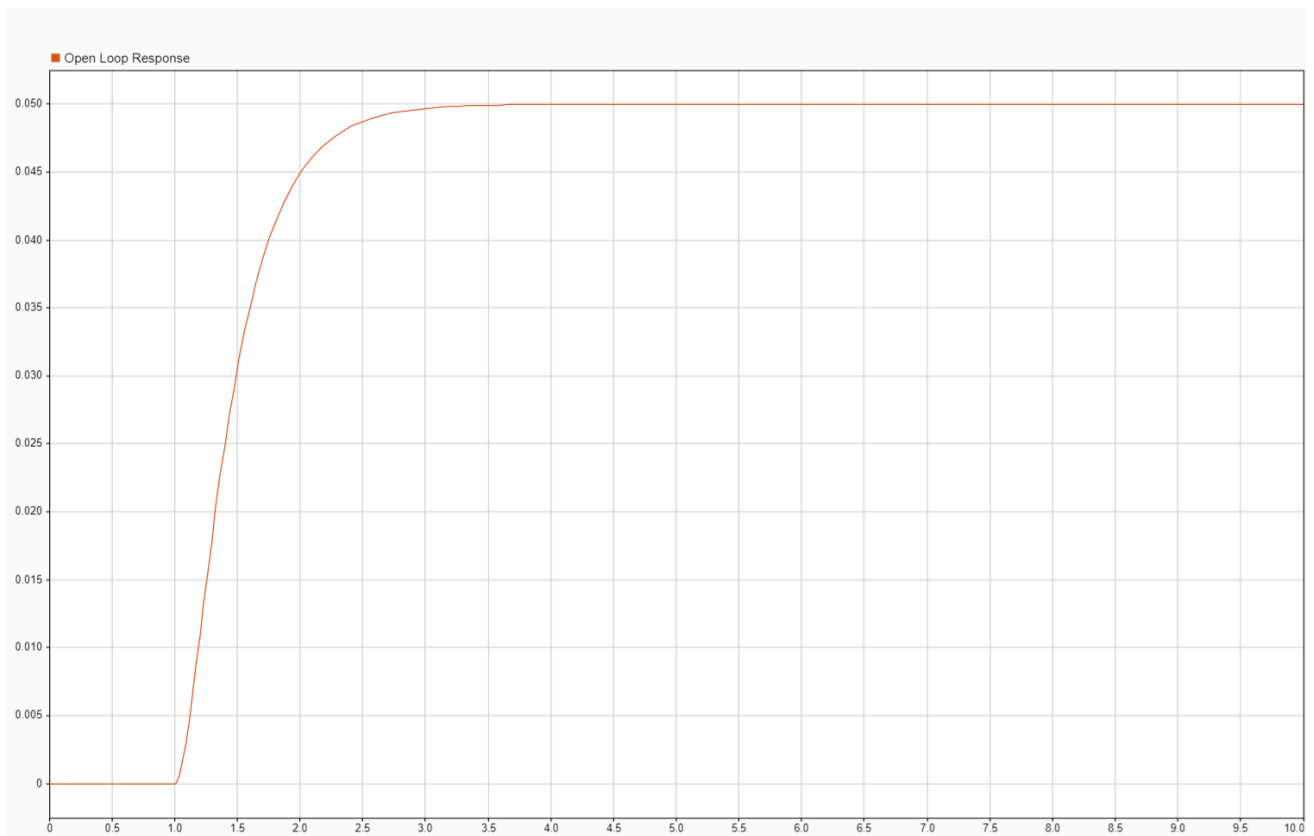


Fig.5: Open Loop Response of 2nd order spring-mass-damper system.

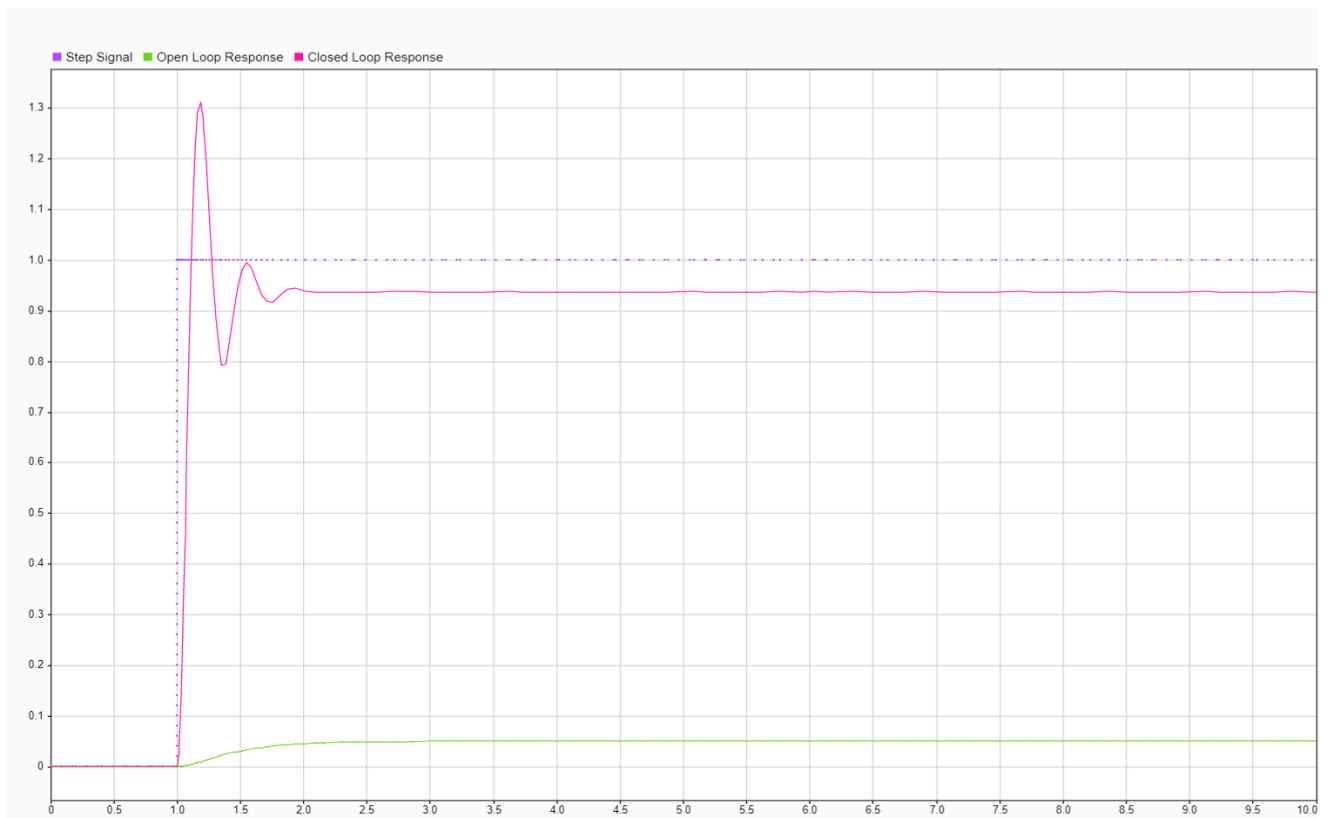


Fig.6: Closed Loop Response using P Control on 2nd order spring-mass-damper system.

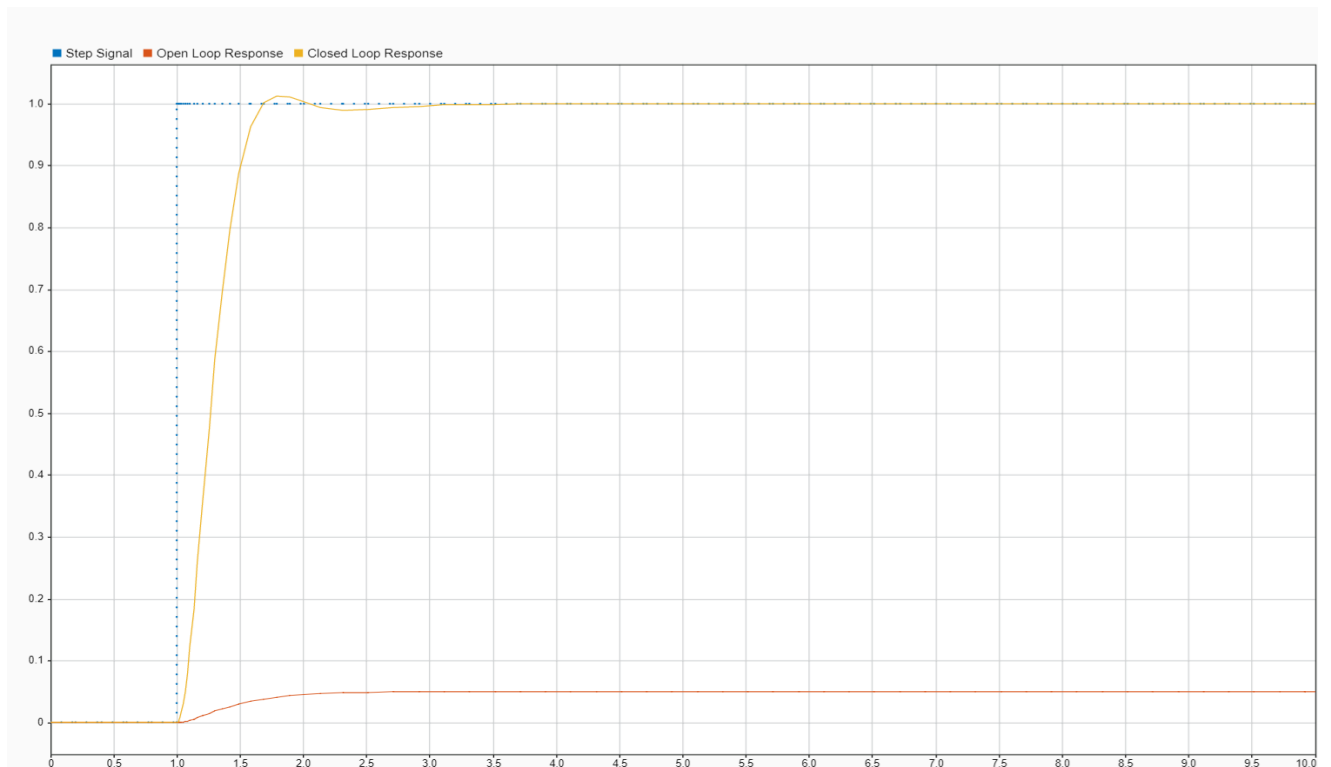


Fig.7: Closed Loop Response using P-I Control on 2nd order spring-mass-damper system.

Practice Problem:

Q). Plot Step Response of the given transfer function model with P and PI controller using MATLAB/Simulink.

$$G(s) = \frac{2s + 5}{s^2 + 2s + 4}$$

Assume $K_p = 2$ and $K_i = 10$.