

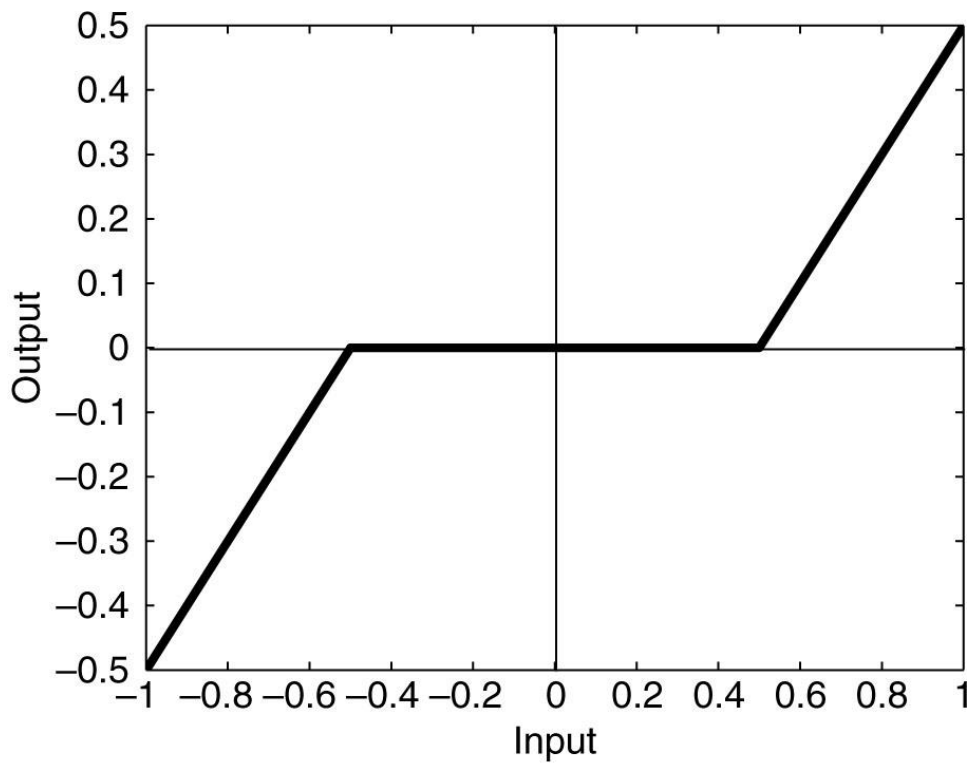
**Problem 10.20:**

- 20.** Use Transfer Function blocks to construct a Simulink model to plot the solution of the following equations for  $0 \leq t \leq 2$

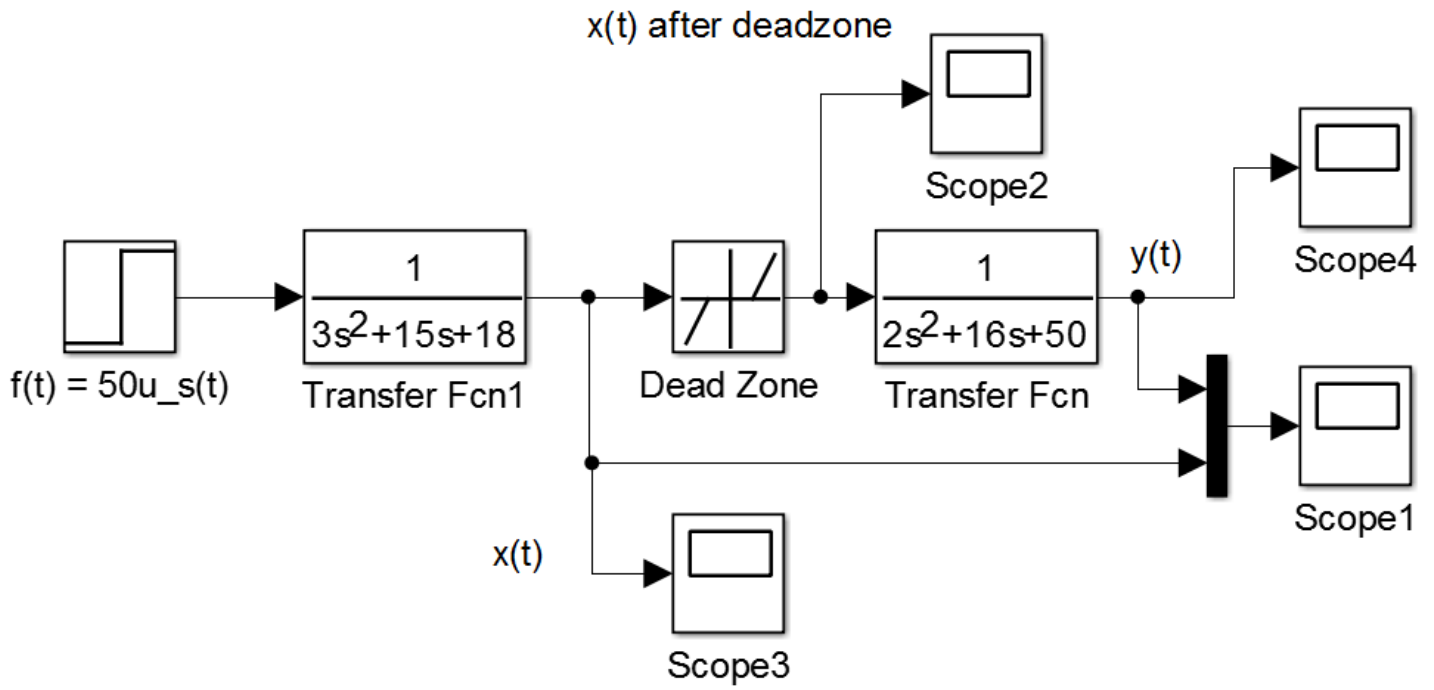
$$3\ddot{x} + 15\dot{x} + 18x = f(t) \quad x(0) = \dot{x}(0) = 0$$

$$2\ddot{y} + 16\dot{y} + 50y = x(t) \quad y(0) = \dot{y}(0) = 0$$

where  $f(t) = 50u_s(t)$ . At the output of the first block there is a dead zone for  $-1 \leq x \leq 1$ . This limits the input to the second block.



**Figure 10.5–1** A dead-zone nonlinearity



(t) after dea

Dead Zone

Scope3

Function Block Parameters: Dead Zone

Dead Zone

Output zero for inputs within the dead zone. Offset input signals by either the Start or End value when outside of the dead zone.

Parameters

Start of dead zone:

-1

End of dead zone:

1

Saturate on integer overflow

Treat as gain when linearizing

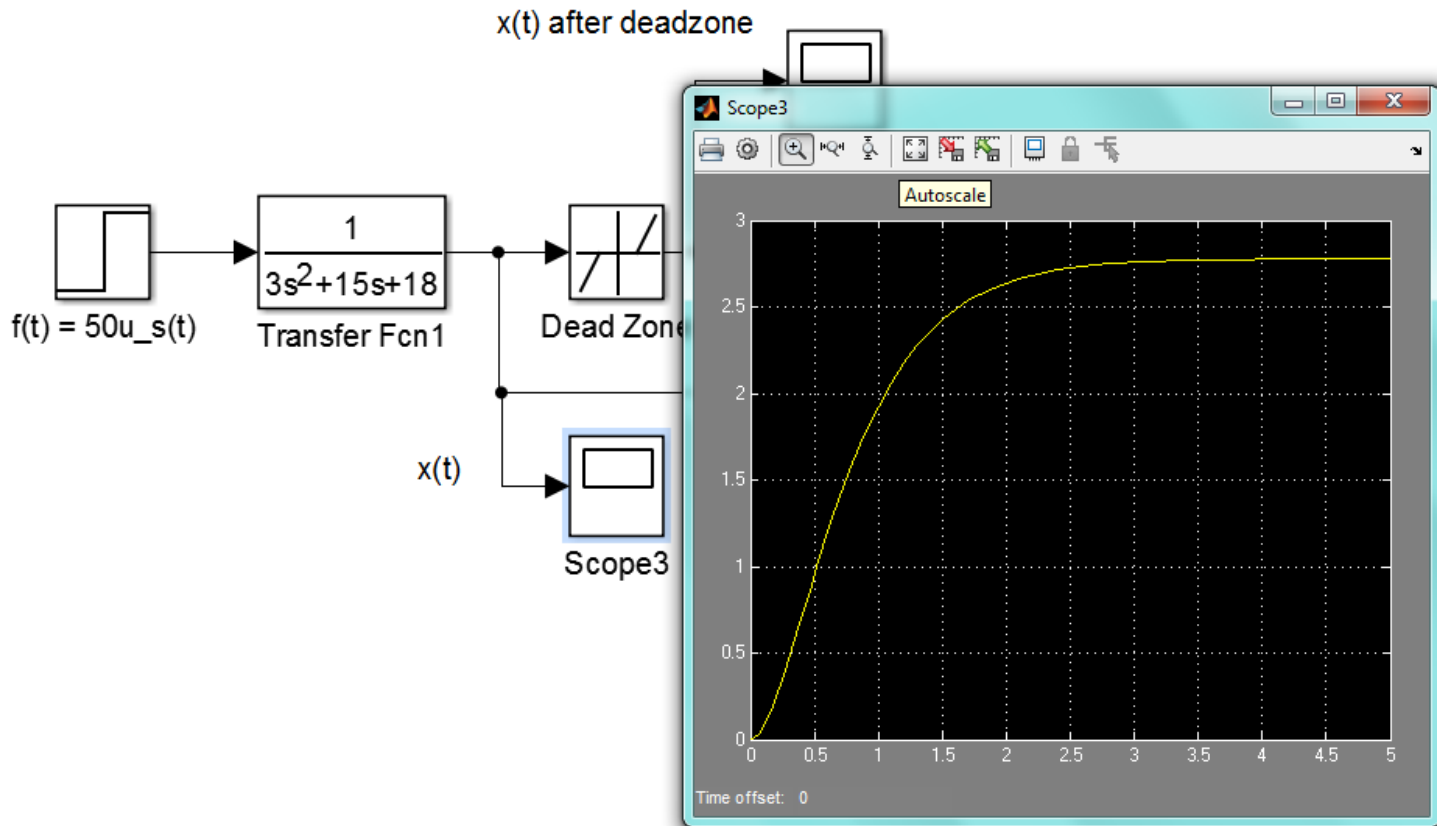
Enable zero-crossing detection

Sample time (-1 for inherited):

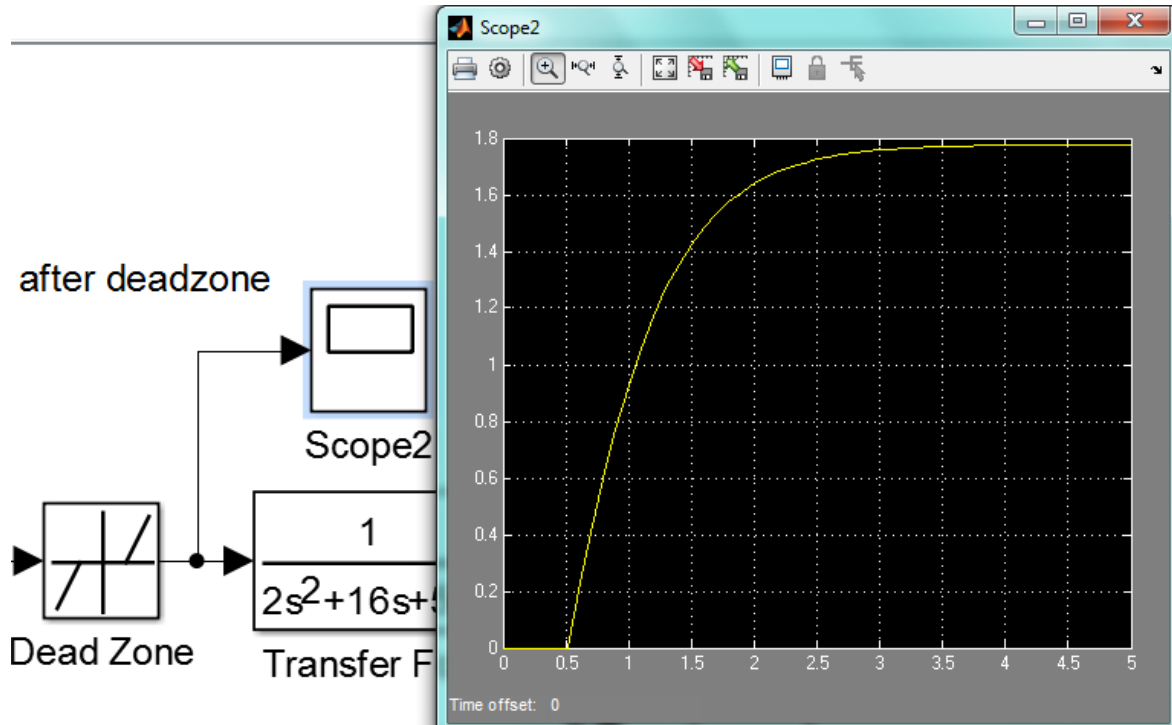
-1

OK Cancel Help Apply

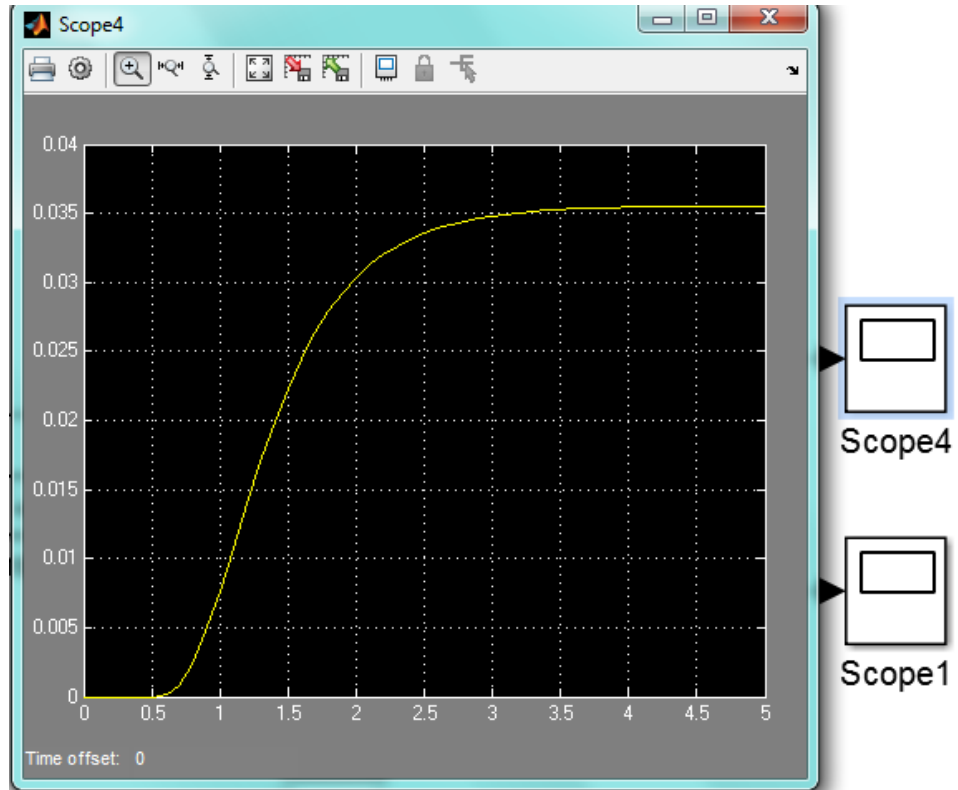
Plot of  $x(t)$ :



Plot of  $x(t)$  after the Dead Zone block:



Plot of  $y(t)$ :



Plot of  $x(t)$  and  $y(t)$ :

