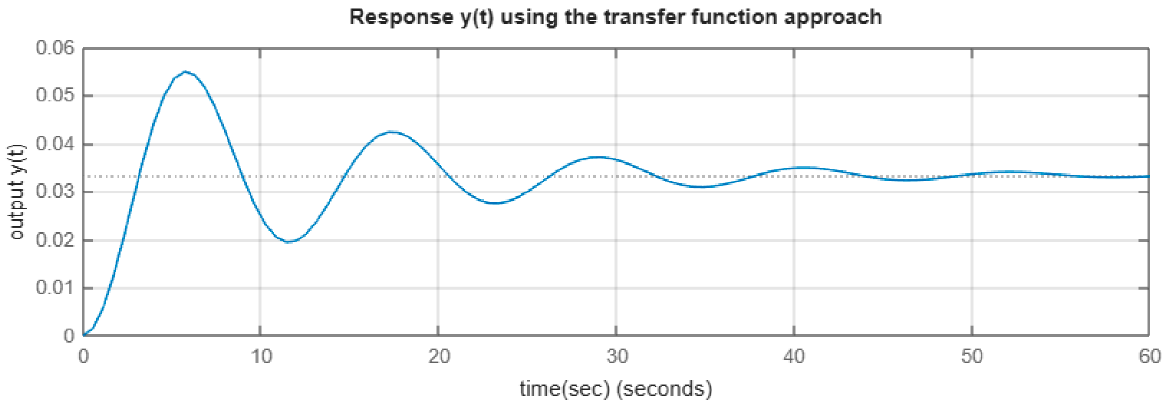
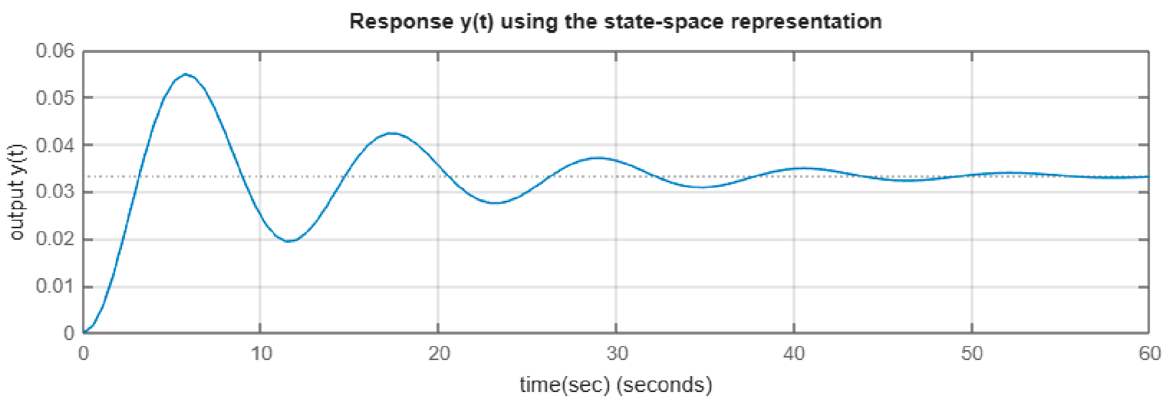
/MATLAB Drive/MSD2.m

```
clearvars;close all;clc;
tini = 0;
tend = 60;
tinc = 0.01;
t = tini:tinc:tend;             %simulation time
F0 = 0.5;                       %static force, in lb

m = 50;                         %mass of the translational system
k = 15.0;                       %spring constant, in lb/in
d = 7.5;                        %damping coefficient, in lb.sec/m

% initial conditions
y0 = 0;                         %initial displacement, y0
v0 = 0;                         % no initial speed

%numerator of the polynomial of the tf
num = [F0/m];

%denominador of the polynomial of the tf
den = [1 (d/m) (k/m)];

%transfer function model of this system is:
sys1 = tf(num,den)
subplot(2,1,1);
step(sys1, tend);
xlabel('time(sec)'); ylabel('output y(t)');
title('Response y(t) using the transfer function approach');
grid on;

% convert the transfer function model to the state-space representation
[A,B,C,D] = tf2ss(num,den);

%using the state-space equations
sys_ss = ss(A,B,C,D);

%figure(2);
subplot(2,1,2);
step(sys_ss, tend);
xlabel('time(sec)'); ylabel('output y(t)');
title('Response y(t) using the state-space representation');
grid on;
```

```
sys1 =

         0.01
  ------------------
  s^2 + 0.15 s + 0.3

Continuous-time transfer function.
Model Properties
>>
```


Response y(t) using the transfer function approach
output y(t)
0.06
0.05
0.04
0.03
0.02
0.01
0
0
10
20
30
40
50
60
time(sec) (seconds)


Response y(t) using the state-space representation
output y(t)
0.06
0.05
0.04
0.03
0.02
0.01
0
0
10
20
30
40
50
60
time(sec) (seconds)