ECEn 483

HW 10

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IV.14

(a)

function tau=UUV\_ctrl(in,P)

theta\_c = in(1);

theta = in(2);

theta\_dot = in(3);

x = [theta; theta\_dot];

tau = -K\*x;

(b)

P = [-1.2-1.8j -1.2+1.8j];

(c)

C = [G F\*G];

if rank(C) ~= 2

display('NOT CONTROLLABLE');

end

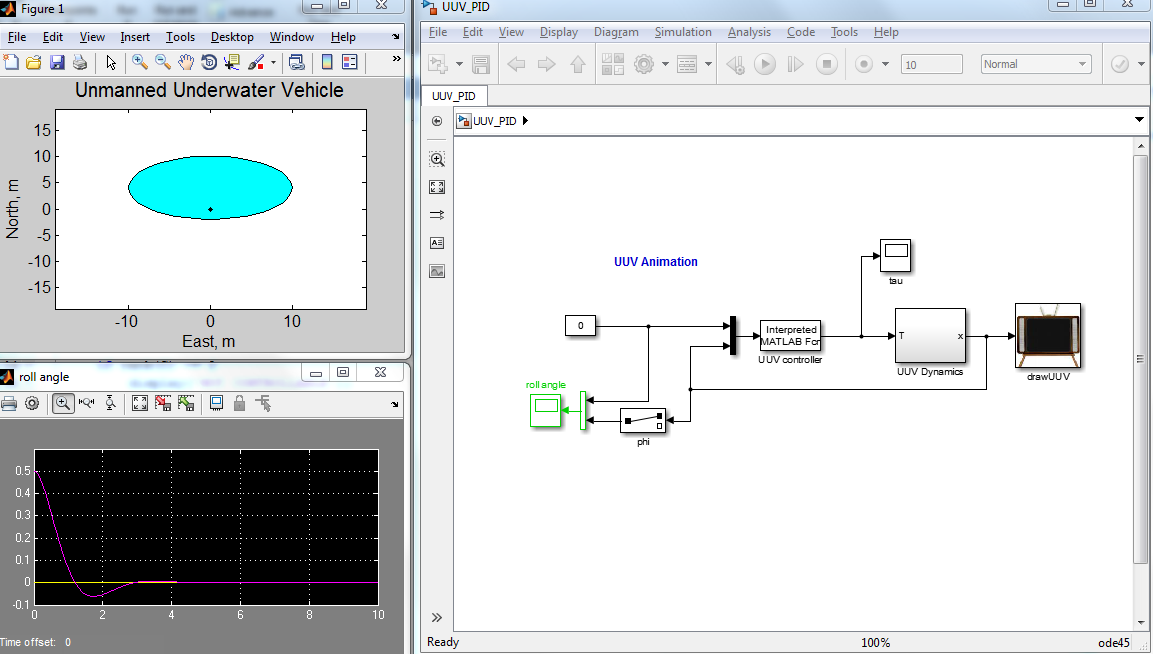
(d)

P = [-1.2-1.8j -1.2+1.8j];

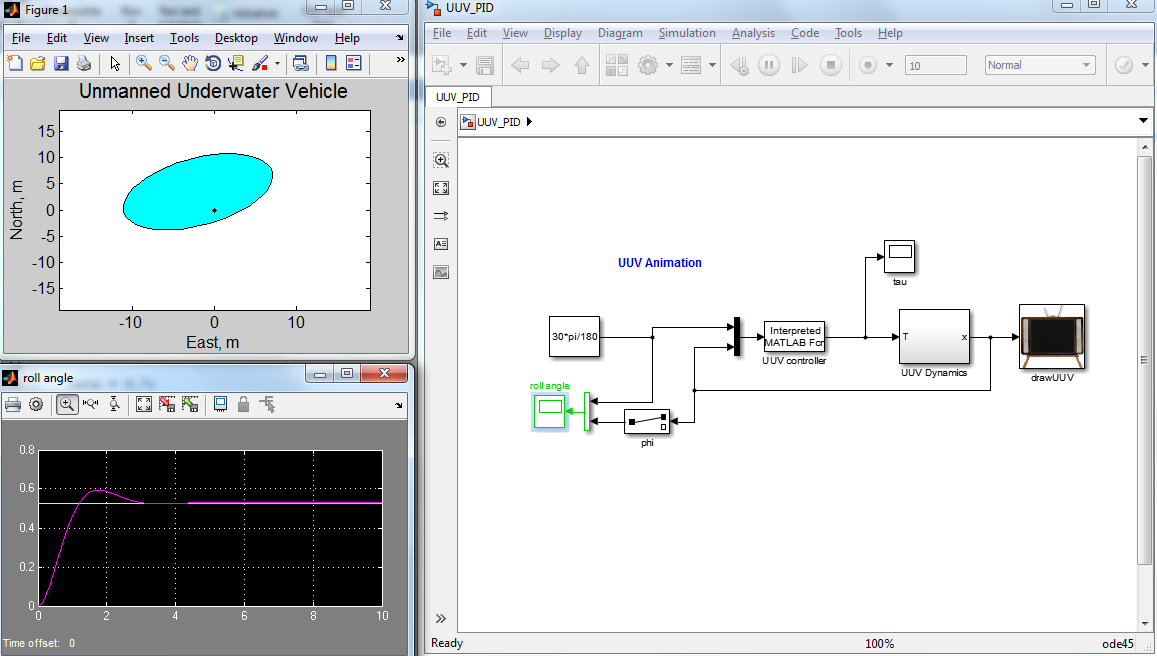
K = place(F,G,P)  
K = 103.0000, 151.8000

It is because without tacking the reference input, it acts like PD controller.

(e)



(f)



Nbar = 210.6000

V.14

(a)

function Force=ballbeam\_ctrl(in,AP)

z\_d = in(1);

z = in(2);

theta = in(3);

zdot = in(4);

thetadot = in(5);

t = in(6);

x = [z;theta;zdot;thetadot];

Force = -K\*x;

(b)

C = [G F\*G F^2\*G F^3\*G];

if rank(C) ~= 4

display('NOT CONTROLLABLE');

end

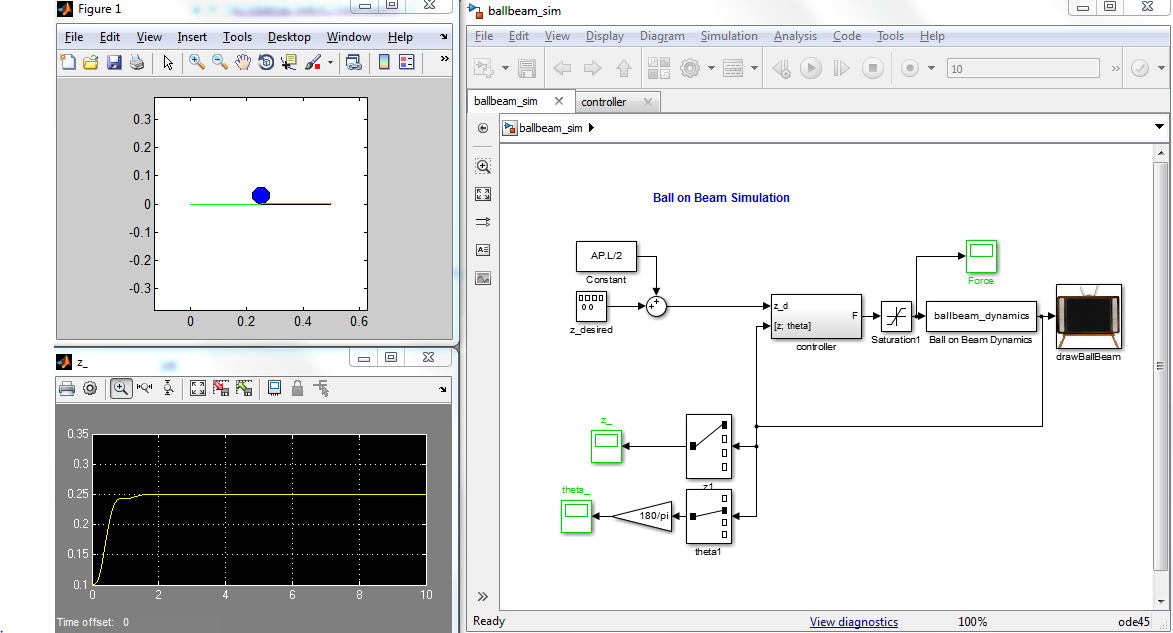
(c)

P = [-4.5-4.5j; -4.5+4.5j; -6-1.5j; -6+1.5j];

K = place(F,G,P)

K = -90.3099 70.4203 -44.7248 7.9188

(d)



VI.14

(a)

function F = crane\_ctrlss(in,P)

z\_c = in(1);

zdot = in(2);

thetadot = in(3);

z = in(4);

theta = in(5);

x = [zdot thetadot z theta]';

x1 = [0 0 0 0]';

F = -P.K\*x;

(b)

C = [G F\*G F\*F\*G F\*F\*F\*G];

if rank(C) == n

display('controllable');

end

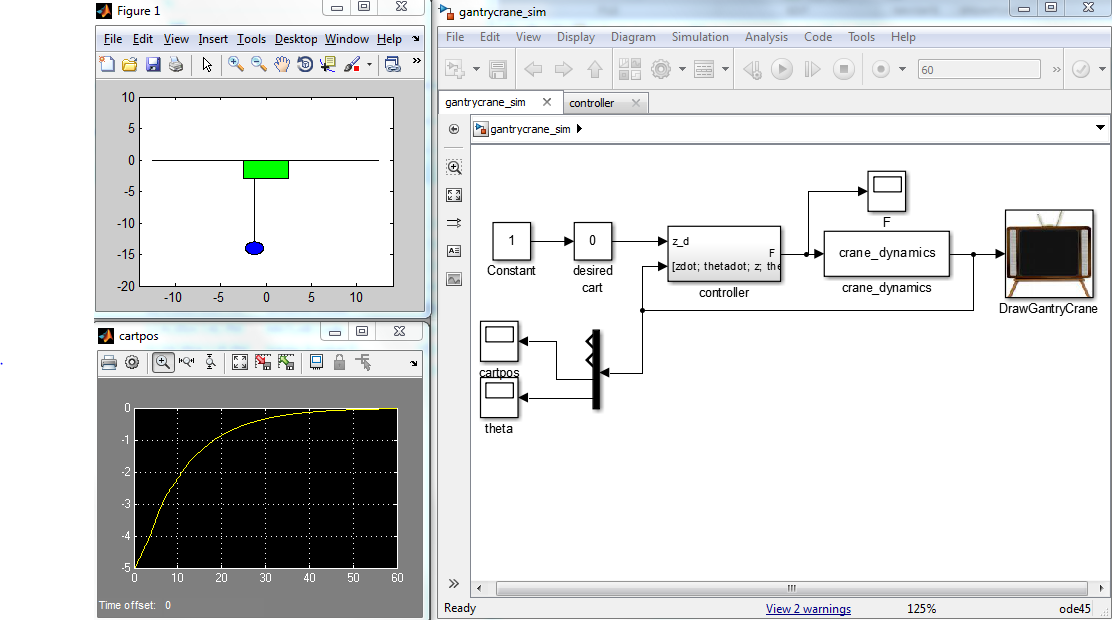
(c)

Poles = [-.55+.75j -.55-.75j -.6 -1.5];

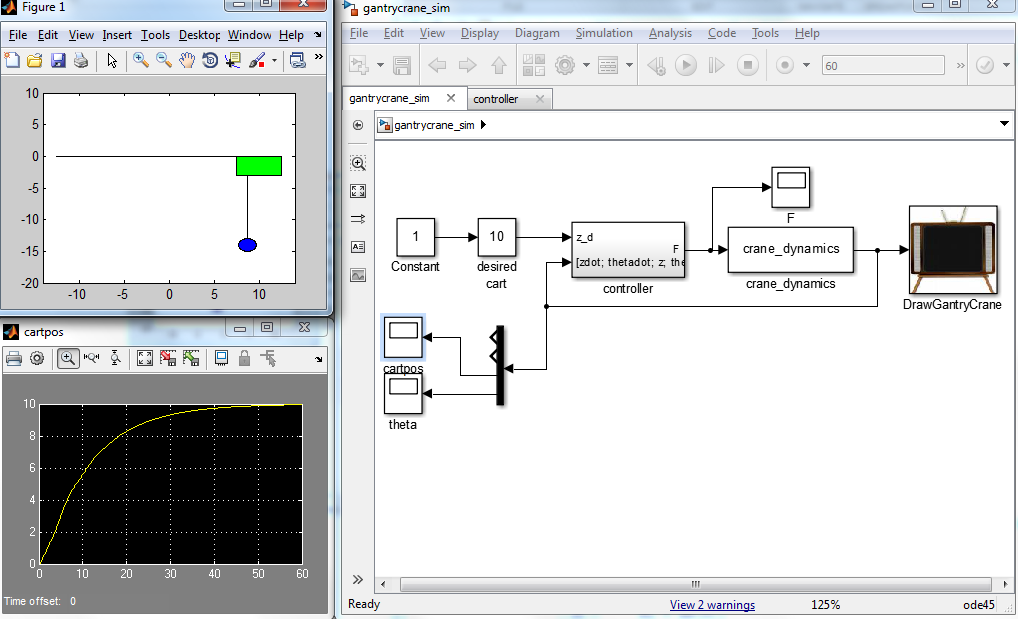
P.K = place(F,G,Poles)/5;

K = 1.0e+03 \*(0.8180 -1.0197 0.2381 -5.9199)

(d)



(e)

 Nbar = 238.0722