Contents

Student ID

```
ID = 316098052;
disp(ID)
```

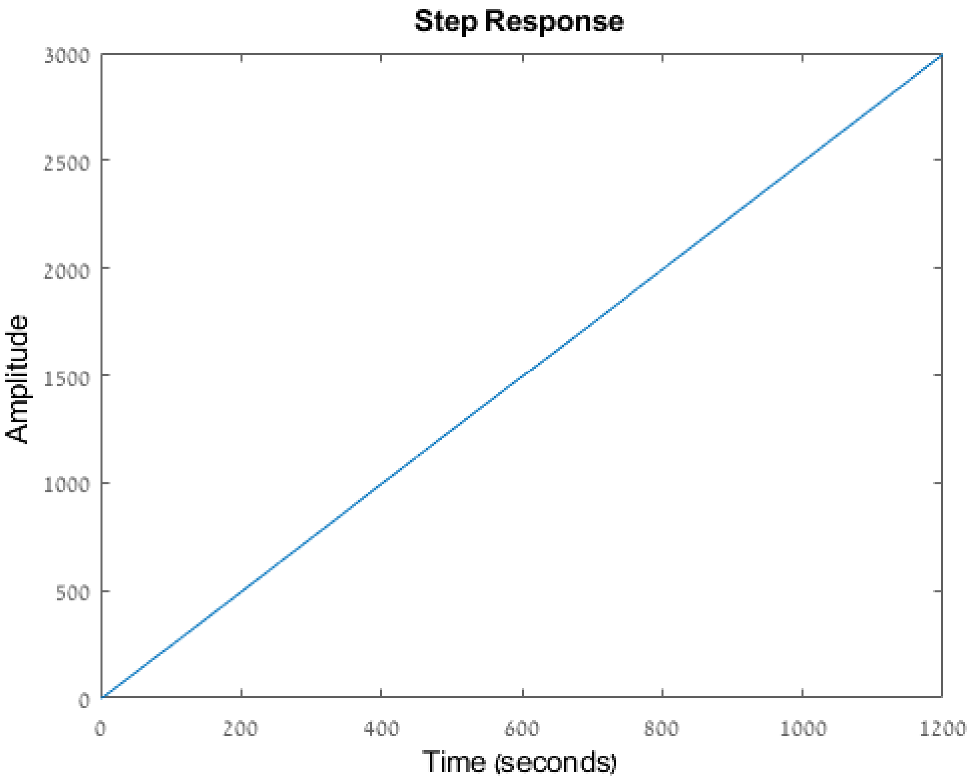
```
316098052
```

1 Manipulator control

2. Response of the closed-loop system to a step input

```
A = [0 1;0 -0.4];
B = [0 1]';
C = [1 0];
D = 0;
sys = ss(A,B,C,D);
test = tf([0 1],[1 0.4 0]);
pzmap(test)
```

```
step(test)
```



4. Response of the state variable feedback system to a step input

```
A_k = [0 1;-18.4 -5.9];
B = [0 1]';
C = [1 0];
D = 0;
sys = ss(A_k,B,C,D);

% pzmap(sys)
step(sys);
stepinfo(sys)
```

```
ans =

  struct with fields:

        RiseTime: 0.4873
    SettlingTime: 1.3984
     SettlingMin: 0.0491
     SettlingMax: 0.0571
       Overshoot: 5.0977
      Undershoot: 0
            Peak: 0.0571
        PeakTime: 1.0147
```

```
syms L1 L2 LAM
A = [0 1;-7 -2];
L = [L1 L2]';
C = [1 4];
O = LAM*eye(2)-A - L*C;
de = det(O);
```

5 Pole-placement algorithm for state-space model

```
clear
check = myPolePlacement(magic(5), [1;2;3;4;5], [-1, -2, -3, -4, -5])
K = place(magic(5), [1;2;3;4;5], [-1, -2, -3, -4, -5])


function [out] =  myPolePlacement(A, B, p)
    s = size(A);
    K  = sym('k',[1 s(1)]);
    A_s = A-B*K;
    p2 = poly(p);
    poli = charpoly(A_s);
    sol = poli == p2;
    sol_k = solve(sol , K)
    A = struct2cell(sol_k);
    out = double(cat(2,A{:}));
end
```

```
sol_k =

  struct with fields:
    k1: [1×1 sym]
    k2: [1×1 sym]
    k3: [1×1 sym]
    k4: [1×1 sym]
    k5: [1×1 sym]


check =

   10.5062   10.6291    3.5642   -2.7071    9.6742


K =

   10.5062   10.6291    3.5642   -2.7071    9.6742
```

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