```
clear all;
M = 0.815;
m = 0.210;
Ip = 0.305;
g = 9.8;
a = 1.719;
b = 7.682;
e = 3.86;

A32 = -(3/4 * m*g) / (M+ (1/4)*m);
A33 = -(e+b) / (M + (1/4)*m);
A42 = (3/4)*(g/Ip)*(1+(3/4)*(m/(M+ (1/4)*m)));
A43 = (3/4)*((e+b)/Ip)/(M + (1/4)*m);

A = [0 0 1 0; 0 0 0 1; 0 A32 A33 0; 0 A42 A43 0];

B31 = a / (M+ (1/4)*m);
B41 = -(3/4)*(a/Ip)/(M+(1/4)*m);

B = [0; 0; B31; B41];
C = eye(4);
rank(ctrb(A,B));

Q1 = diag([5000 3000 20 20]);
R = 1;
[X1,L1,K1] = care(A,B,Q1,R)

Q2 = diag([5000 1500 20 20]);
[X2,L2,K2] = care(A,B,Q2,R);

x0 = [0; 0.06; 0; 0];

A1 = A-B*K1;
B1 = [0; 0; 0; 0];
sys1 = ss(A1,B1, C, 0);
t = 0:0.05:5;
u = zeros(length(t),1);
lsim(sys1,u,t,x0)
grid on
```