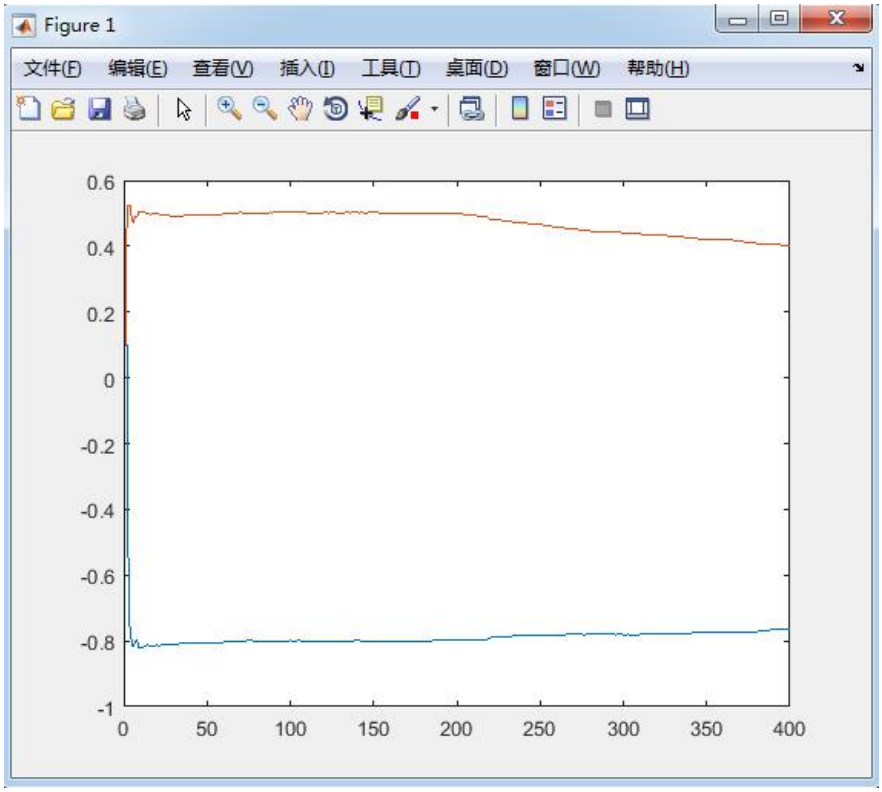
第三章第 6 题

%递推最小二乘法

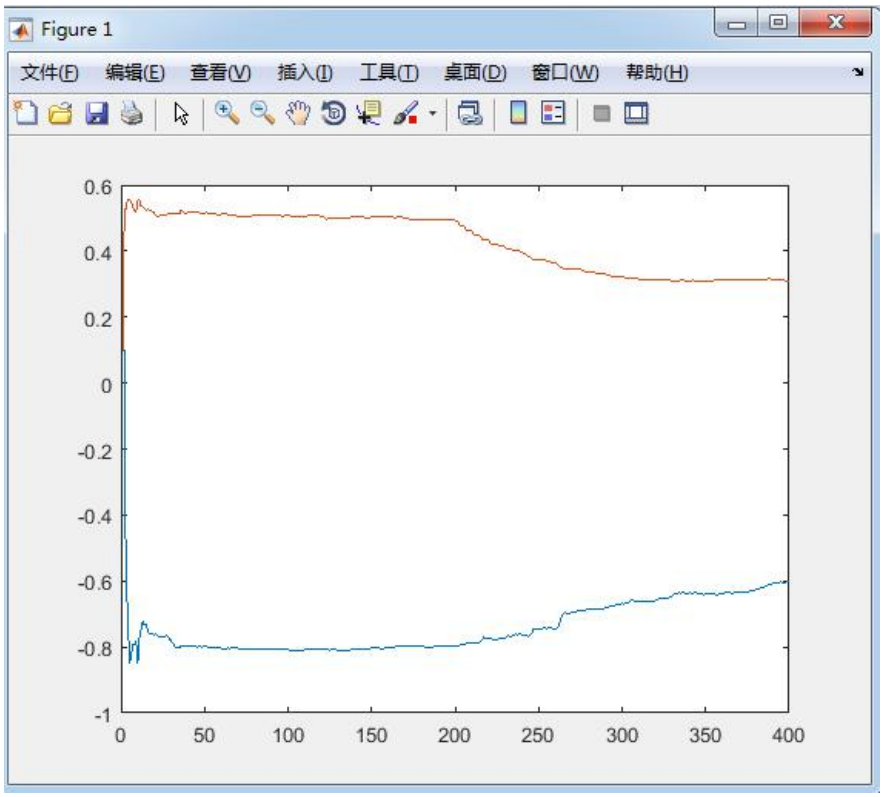
```
e=normrnd(0,0.05,400,1);
u=randn(400,1);
y=zeros(400,1);
x=zeros(2,2);
u(1)=1;
y(1)=0; %取初值
for  i=2:400
    if i<201
     y(i)=0.5*u(i-1)-0.8*y(i-1)+e(i-1);
    else
      y(i)=0.3*u(i-1)-0.6*y(i-1)+e(i-1);
    end
end
R0=1;%就是一个赋值
P=10^4*eye(2);
theta=[0.1;0.1];
for k=2:400
    X=[ y(k-1) u(k-1)]';
    alfa=1/(R0+X'*P*X);%计算因子
    L=alfa*P*X;
    theta(:,k)=theta(:,k-1)+L*(y(k)-X'*theta(:,k-1));%theta=θ ?????%每迭代一次，theta 就增加一列，新增加的那一列就是最新的参数估值。
    P=P/R0-alfa*P*X*X'*P;
end
figure(1)

i=1:400;
plot(i,theta(1,:),i,theta(2,:))
```



%带遗传因子的最小二乘参数估计

```
e=normrnd(0,0.05,400,1);
u=randn(400,1);
y=zeros(400,1);
x=zeros(2,2);
u(1)=1;
y(1)=0; %取初值
for  i=2:400
    if i<201
     y(i)=0.5*u(i-1)-0.8*y(i-1)+e(i-1);
    else
      y(i)=0.3*u(i-1)-0.6*y(i-1)+e(i-1);
    end
end
R0=0.98;%遗传因子
P=10^4*eye(2);
theta=[0.1;0.1];
for k=2:400
    X=[ y(k-1) u(k-1)]';
    alfa=1/(R0+X'*P*X);%计算因子
    L=alfa*P*X;
```

```
    theta(:,k)=theta(:,k-1)+L*(y(k)-X'*theta(:,k-1));%theta=θ?????%每迭代一次，theta就增加一列，新增加的那一列就是最新的参数估值。
    P=1/R0*(P-alfa*P*X*X'*P);
end
figure(1)
i=1:400;
plot(i,theta(1,:),i,theta(2,:))
```



%变遗传因子的最小二乘估计

```
e=normrnd(0,0.05,400,1);
theta=zeros(2,400);
u=randn(400,1);
y=zeros(400,1);
x=zeros(2,2);
u(1)=1;
y(1)=0; %取初值
for  i=2:400
    if i<201
     y(i)=0.5*u(i-1)-0.8*y(i-1)+e(i-1);
    else
```

```
      y(i)=0.3*u(i-1)-0.6*y(i-1)+e(i-1);
    end
end
R0=0.98;%初始遗传因子
P=10^4*eye(2);
theta=[0.1;0.1];
Sum=2.5;
for k=2:400
X=[ y(k-1) u(k-1)]';
E=y(k)-X'*theta(:,k-1);
N=P*X/(X'*P*X+1);
theta(:,k)=theta(:,k-1)+N*E;
R0=1-(1-X'*N)*power(E,2)/Sum;
if R0<=0.5
R0=0.5;
end
P=(1-N'*X)*P/R0;
end
figure(1)
i=1:400;
plot(i,theta(1,:),i,theta(2,:))
```