作业6

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(1) 列表：

X(k)	u(k)	X(k+1)=X(k)+u(k)	J=g_D+V(x(k+1),k+1)	V=min J
X(3)				
2.0				4.00
1.5				2.25
1.0				1.00
0.5				0.25
0.0				0.00
X(2)	u(2)	$X_3=X(2)+u(2)$	$J=x^2(2)+u^2(2)+V(x(3),3)$	$V(X(2),u_2)$
2.0	-0.5	1.5	$(2.0)^2+(0.5)^2+(1.5)^2$	$V(2,-0.5)=6.5$
	0.0	2.0	$(2.0)^2+(0.0)^2+(2.0)^2$	
	0.5	2.5	非容许控制	
1.5	-0.5	1.0	$(1.5)^2+(0.5)^2+(1.0)^2$	$V(1.5,-0.5)=3.5$
	0.0	1.5	$(1.5)^2+(0.0)^2+(1.5)^2$	
	0.5	2.0	$(1.5)^2+(0.5)^2+(2.0)^2$	
1.0	-0.5	0.5	$(1.0)^2+(0.5)^2+(0.5)^2$	$V(1.0,-0.5)=1.5$
	0.0	1.0	$(1.0)^2+(0.0)^2+(1.0)^2$	
	0.5	1.5	$(1.0)^2+(0.5)^2+(1.5)^2$	
0.5	-0.5	0.0	$(0.5)^2+(0.5)^2+(0.0)^2$	$V(0.5,-0.5)=0.5$
	0.0	0.5	$(0.5)^2+(0.0)^2+(0.5)^2$	$V(0.5,0.0)=0.5$
	0.5	1.0	$(0.5)^2+(0.5)^2+(1.0)^2$	
0.0	-0.5	-0.5	非容许控制	$V(0.0,0.0)=0.0$
	0.0	0.0	$(0.0)^2+(0.0)^2+(0.0)^2$	
	0.5	0.5	$(0.0)^2+(0.5)^2+(0.5)^2$	

X(k)	u(k)	X(k+1)=X(k)+u(k)	J=g_D+V(x(k+1),k+1)	V=min J
X(1)	u(1)	$X_2=X(1)+u(1)$	$J=x^2(1)+u^2(1)+V(x(2),2)$	$V(X(1),u(1))$
2.0	-0.5	1.5	$(2.0)^2+(0.5)^2+3.5$	$V(2,-0.5)=7.75$
	0.0	2.0	$(2.0)^2+(0.0)^2+6.5$	
	0.5	2.5	非容许控制	
1.5	-0.5	1.0	$(1.5)^2+(0.5)^2+1.5$	$V(1.5,-0.5)=4$
	0.0	1.5	$(1.5)^2+(0.0)^2+3.5$	
	0.5	2.0	$(1.5)^2+(0.5)^2+6.5$	
1.0	-0.5	0.5	$(1.0)^2+(0.5)^2+0.5$	$V(1,-0.5)=1.75$
	0.0	1.0	$(1.0)^2+(0.0)^2+1.5$	
	0.5	1.5	$(1.0)^2+(0.5)^2+3.5$	
0.5	-0.5	0.0	$(0.5)^2+(0.5)^2+0.0$	$V(0.5,-0.5)=0.5$
	0.0	0.5	$(0.5)^2+(0.0)^2+0.5$	
	0.5	1.0	$(0.5)^2+(0.5)^2+1.5$	
0.0	-0.5	-0.5	非容许控制	$V(0.0,0.0)=0.0$
	0.0	0.0	$(0.0)^2+(0.0)^2+0.0$	
	0.5	0.5	$(0.0)^2+(0.5)^2+0.5$	

X(k)	u(k)	X(k+1)=X(k)+u(k)	J=g_D+V(x(k+1),k+1)	V=min J
X(0)	u(0)	$X_1=X(0)+u(0)$	$J=x^2(0)+u^2(0)+V(x(1),1)$	$V(X(0),u(0))$
2.0	-0.5	1.5	$(2.0)^2+(0.5)^2+4$	$V(2.0,-0.5)=8.125$
	0.0	2.0	$(2.0)^2+(0.0)^2+7.75$	
	0.5	2.5	非容许控制	
1.5	-0.5	1.0	$(1.5)^2+(0.5)^2+1.75$	$V(1.5,-0.5)=4.25$
	0.0	1.5	$(1.5)^2+(0.0)^2+4$	
	0.5	2.0	$(1.5)^2+(0.5)^2+7.75$	
1.0	-0.5	0.5	$(1.0)^2+(0.5)^2+0.5$	$V(1,-0.5)=1.75$
	0.0	1.0	$(1.0)^2+(0.0)^2+1.75$	
	0.5	1.5	$(1.0)^2+(0.5)^2+4$	
0.5	-0.5	0.0	$(0.5)^2+(0.5)^2+0.0$	$V(0.5,-0.5)=0.5$
	0.0	0.5	$(0.5)^2+(0.0)^2+0.5$	
	0.5	1.0	$(0.5)^2+(0.5)^2+1.75$	
0.0	-0.5	-0.5	非容许控制	$V(0.0,0.0)=0.0$
	0.0	0.0	$(0.0)^2+(0.0)^2+0.0$	
	0.5	0.5	$(0.0)^2+(0.5)^2+0.5$	

查表可得对于 X(0)=0.0，{u(0)=0.0, u(1)=0.0, u(2)=0.0} 使J最小为0

对于 X(0)=0.5，{u(0)=-0.5, u(1)=0.0, u(2)=0.0} 使J最小为0.5

对于 X(0)=1.0，{u(0)=-0.5, u(1)=-0.5, u(2)=0.0} 使J最小为1.75

对于 X(0)=1.5，{u(0)=-0.5, u(1)=-0.5, u(2)=-0.5或u(2)=0.0} 使J最小为4.25

对于 X(0)=2.0，{u(0)=-0.5, u(1)=-0.5, u(2)=-0.5} 使J最小为8.25

(2)

V(f)=0

F: V(F)=J(Ff)+V(f)=12+0=12

φ(F)=f

G: V(G)=min(J(GF)+V(F), J(Gf)+V(f))=min(8+12,15)=15

φ(G)=f

H: V(H)=min(J(HG)+V(G), J(Hf)+V(f))=min(12+15,21)=21

φ(H)=f

C: V(C)=J(CF)+V(F)=20+12=32

φ(C)=F

E: V(E)=min(J(EG)+V(G), J(EH)+V(H))=min(17+15,12+21)=32

φ(E)=G

D: V(D)=min(J(DC)+V(C), J(DF)+V(F), J(DG)+V(G)+J(DE)+V(E))=min(10+32,23+12,19+15,16+32)=34

φ(D)=G

B: V(B)=min(J(BD)+V(D), J(BE)+V(E))=min(15+34,18+32)=49

φ(B)=D

A: V(A)=min(J(AC)+V(C), J(AD)+V(D), J(AB)+V(B))=min(12+32,11+34,18+49)=44

φ(A)=C

S: V(S)=min(J(SA)+V(A), J(SB)+V(B))=min(20+44,15+49)=64

φ(S)=A或B

最短路为 S→A→C→F→f 或 S→B→D→G→f