**源代码**

%%%主函数

function [popt,fval,Tf]=dynprog(ti,k,T,DesFun,SubFun,TranFun,Lt,fixload\_detail)

% k；第k个

% x：状态变量，列：阶段，行：可能的所有状态

% u=Desfun(k.x)，阶段k的状态变量，求出所有允许的决策变量

% v=SubFun(k,x,u), 阶段是指标函数

% TranFun(k,x,u),状态转移函数，其中x是阶段k的状态变量，u是决策变量

% ObjFun(v,f),总指标函数 in the bellman equation: fn+1=min(ObjFun(v,fn))

% fopt consists of 4 colnums, which represents the matrix:[stage number, optimal stragy, optimal decisions, object function value]

% fval is the optimal object function value.

N=length(T(1,:));

xisnan=~isnan(T);

topt=inf\*ones(size(T));

fopt=nan\*ones(size(T));

dopt=fopt;

tmpk1=find(xisnan(:,N));

tmpk2=length(tmpk1);

for i=1:tmpk2

u=feval(DesFun,ti,k,N,T(tmpk1(i),N));

tmpk3=length(u);

for j=tmpk3:-1:1

tmpk4=feval(SubFun,ti,k,N,T(tmpk1(i),N),u(j),Lt,fixload\_detail);

if tmpk4<=topt(i,N)

fopt(i,N)=tmpk4;

dopt(i,N)=u(j);

topt(i,N)=tmpk4;

end

end

end

for ii=N-1:-1:1 %stage

tmp1=find(xisnan(:,ii));

tmp2=length(tmp1);

for i=tmp2:-1:1 %available choice in this stage

u=feval(DesFun,ti,k,ii,T(tmp1(i),ii));

tmp3=length(u);

for j=tmp3:-1:1

tmp00=feval(SubFun,ti,k,ii,T(tmp1(i),ii),u(j),Lt,fixload\_detail);

tmp4=feval(TranFun,ti,k,ii+1,T(tmp1(i),ii),u(j));

tmp4=round(tmp4\*10)/10;

tmp5=T(:,ii+1)-tmp4;

tmp6=find(tmp5==0);

if~isempty(tmp6)

tmp00=tmp00+fopt(tmp6(1),ii+1);

if tmp00<=topt(tmp1(i),ii)

fopt(tmp1(i),ii)=tmp00;

dopt(tmp1(i),ii)=u(j);

topt(tmp1(i),ii)=tmp00;

end

end

end

end

end

fval=fopt(:,1);

tmp0=find(~isnan(fval));

fval=fval(tmp0,1);

popt=[];tmpx=[];tmpd=[];tmpf=[];

tmp01=length(tmp0);

for i=1:tmp01

tmpd(i)=dopt(tmp0(i),1);

tmpx(i)=T(tmp0(i),1);

tmpf(i)=feval(SubFun,ti,k,1,tmpx(i),tmpd(i),Lt,fixload\_detail);

popt(N\*(i-1)+1,[1,2,3,4])=[1,tmpx(i),tmpd(i),tmpf(i)];

for ii=2:N

tmpx(i)=feval(TranFun,ti,k,ii,tmpx(i),tmpd(i));

tmpf1=T(:,ii)-round(tmpx(i)\*10)/10;

tmpf2=find(tmpf1==0);

if~isempty(tmpf2)

tmpd(i)=dopt(tmpf2(1),ii);

end

tmpf(i)=feval(SubFun,ti,k,ii,tmpx(i),tmpd(i),Lt,fixload\_detail);

popt(N\*(i-1)+ii,[1,2,3,4])=[ii,tmpx(i),tmpd(i),tmpf(i)];

end

end

Tf=feval(TranFun,ti,k,N+1,popt(N,2),popt(N,3));

end

%%% 用能决策函数

function u=DesFun(ti,k,n,T)

global para

Q=para(k,:);% [C,H,PR,EER,Tset,del]

global h

global Text

global FIX

tmp=Q(2)\*exp(-Q(2)\*h/Q(1))\*T/Q(4)/(1-exp(-Q(2)\*h/Q(1)));

Pup=tmp-Q(2)/Q(4)\*((Q(5)-Q(6))/(1-exp(-Q(2)\*h/Q(1)))-Text(ti+n-1));

Pdown=tmp-Q(2)/Q(4)\*((Q(5)+Q(6))/(1-exp(-Q(2)\*h/Q(1)))-Text(ti+n-1));

if FIX==1

%Inverter

if Pup>Q(3)

Pup=Q(3);

end

if Pdown<0

Pdown=0;

end

Pup=round(Pup/100-0.5)\*100;

Pdown=round(Pdown/100+0.499999)\*100;

u=Pdown:100:Pup;

else

%fix

if Pup>Q(3)

if Pdown<0

u=[0,Q(3)];

else

u=Q(3);

end

else

if Pdown<0

u=0;

else

error

end

end

end

%%%状态转移函数

function y=TranFun(ti,k,n,T,u)

global para

Q=para(k,:);% [C,H,PR,EER,Tset,del]

global h

global Text

y=exp(-Q(2)/Q(1)\*h)\*T+(1-exp(-Q(2)/Q(1)\*h))\*(Text(ti+n-1)-Q(4)/Q(2)\*u);

end

%%% 用能成本函数

function v=SubFun(ti,k,n,T,u,Lt,fixload\_detail) %microgrid

global h

global RPG

global fixload

sl=u+fixload\_detail(k,ti+n-1);

all=sum(Lt(:,n))-Lt(k,n)+u+fixload(ti+n-1);

v=sl\*((h/3600\*(0.036\*(all-RPG(ti+n-1))/1000)^2))+h/3600\*0.01413\*(all-RPG(ti+n-1))/1000+0.1\*(h/3600)\*RPG(ti+n-1)/1000;

%

end