主程序：

function mypdesolution

c=1;

a1 =48.06;

b1 =764.3;

c1 =1522;

layer\_d=[0.0006,0.006,0.0036,0.0055];

xspan=[0 sum(layer\_d)];

tspan=[0 4000];

ngrid=[400000 10];%t,x

k=[0.082,0.37,0.045,0.028];

k\_transition=[0.134,0.08,0.0345];

C=[1377,2100,1726,1005];

ro=[300,862,74.2,1.18];

f=@(x)37;

g1=@(t)65;

d1=ngrid(1)/range(tspan);

g2=@(t)37;%(t)a1\*exp(-((t/d1-b1)/c1)^2);

[T,x,t]=rechuandao(c,f,g1,g2,xspan,tspan,ngrid,layer\_d,k,k\_transition,C,ro);

[x,t]=meshgrid(x,t);

fprintf('矩阵大小%f,%f',size(T))

fprintf('x=%f',size(x))

fprintf('t=%f',size(t))

mesh(x,t,T);

xlabel('x')

ylabel('t')

zlabel('T')

output\_matrix=zeros(range(tspan),ngrid(2));

output\_count=1;

for i=1:ngrid(1)

if(mod(i-1,100)==0)

output\_matrix(output\_count,:)=T(i,:);

output\_count=output\_count+1;

end

end

% data\_cell=mat2cell(output\_matrix,ones(range(tspan),1),ones(ngrid(2),1));

% title('time','x=1.52mm','x=3.04mm','x=4.56mm','x=6.08mm','x=7.6mm','x=9.12mm','x=10.64mm','x=12.16mm','x=13.68mm','x=15.2mm');

%result=[title];

s=xlswrite('E:\同济\大三上\数模\program\A3(基础模型) - 副本\problem2.xlsx',output\_matrix);

-------------------------------------------------------------------------------

子程序

function [U,x,t]=rechuandao(c,f,g1,g2,xspan,tspan,ngrid,layer\_d,k,k\_transition,C,ro)

n=ngrid(1);

m=ngrid(2);

h=range(xspan)/(m-1);

x=linspace(xspan(1),xspan(2),m);

t\_step=range(tspan)/(n-1);

t=linspace(tspan(1),tspan(2),n);

x\_step=h;

r=c^2\*t\_step/h^2;

% if r>0.5

% error('jakfjl')

% end

U=zeros(ngrid);

U(1,:)=f(x);

U(:,1)=g1(t);

%U(:,m)=g2(t);

for i=1:n%range(tspan)

U(i,m)=g2(i);

fprintf('uim=%f',U(i,m))

end

for j=2:n

for i=2:m-1

if (j<(layer\_d(1))/x\_step-1)

para=[k(1),C(1),ro(1)];

elseif (j>((layer\_d(1))/x\_step-1)&&j<(layer\_d(1)/x\_step))

para=[k\_transition(1),C(1),ro(1)];

elseif (j>((layer\_d(1))/x\_step)&&j<(layer\_d(1)/x\_step+1))

para=[k\_transition(1),C(2),ro(2)];

elseif (j>(layer\_d(1)/x\_step+1)&&j<((layer\_d(1)+layer\_d(2))/x\_step-1))

para=[k(2),C(2),ro(2)];

elseif (j>((layer\_d(1)+layer\_d(2))/x\_step-1)&&j<((layer\_d(1)+layer\_d(2))/x\_step))

para=[k\_transition(2),C(2),ro(2)];

elseif (j>((layer\_d(1)+layer\_d(2))/x\_step)&&j<((layer\_d(1)+layer\_d(2))/x\_step+1))

para=[k\_transition(2),C(3),ro(3)];

elseif (j>((layer\_d(1)+layer\_d(2))/x\_step+1)&&j<((layer\_d(1)+layer\_d(2)+layer\_d(3))/x\_step-1))

para=[k(3),C(3),ro(3)];

elseif (j>((layer\_d(1)+layer\_d(2)+layer\_d(3))/x\_step-1)&&j<((layer\_d(1)+layer\_d(2)+layer\_d(3))/x\_step))

para=[k\_transition(3),C(3),ro(3)];

elseif (j>((layer\_d(1)+layer\_d(2)+layer\_d(3))/x\_step)&&j<((layer\_d(1)+layer\_d(2)+layer\_d(3))/x\_step)+1)

para=[k\_transition(3),C(4),ro(4)];

else

para=[k(4),C(4),ro(4)];

end

a=para(1)/(para(2)\*para(3));

Fo=(a\*t\_step)/x\_step^2;

Bi=(h\*x\_step)/para(1);

temp1=1/(2\*Bi+2);

if Fo>temp1

fprintf('error')

end

U(j,i)=Fo\*(U(j-1,i-1)+U(j-1,i+1))+(1-2\*Fo)\*U(j-1,i);

end

end