

ภาคผนวก ข.โปรแกรมคอมพิวเตอร์สำหรับการถ่ายโอนความร้อนและมวลสาร

การถ่ายโอนความร้อน

โปรแกรมหลัก (pdemodel.m)

```
global res
%function pdemodel
[pde_fig,ax]=pdeinit;
pdetool('appl_cb',9);
set(ax,'DataAspectRatio',[1 0.15 1]);
set(ax,'PlotBoxAspectRatio',[10 7 385]);
set(ax,'XLim',[-0.001 0.051]);
set(ax,'YLIM',[-0.0001 0.0051]);
set(ax,'XTickMode','auto');
set(ax,'YTickMode','auto');

%Geometry description:
pdirect([5e-005 0.05 1.5e-005 0.005],'R1');
set(findobj(get(pde_fig,'Children'),'Tag','PDEEval'),'String','R1')

%Boundary conditions:
pdetool('changemode',0)
pdesetbd(4,'dir',1,'1','120')
pdesetbd(3,'dir',1,'1','120')
pdesetbd(2,'dir',1,'1','120')
pdesetbd(1,'dir',1,'1','120')
```

```

%Mesh generation:
%setprop(pde_fig,'Hgrad',1.3);
%setprop(pde_fig,'refinemethod','regular');
pdetool('initmesh')
pdetool('refine')
pdetool('refine')

%PDE coefficients:

%solve first path
pdeseteq(2,'0.655','250','((-32000)+250).*(120)',(930).*(3450)','0:30','26','0.0','[0 100]')
mypde_solve

% store result in u1;
u1=u;

%solve next path
pdeseteq(2,'0.495','250','((-17000)+250).*(120)',(930).*(3050)','31:600','26','0.0','[0 100]')
mypde_solve

% store result in u2;
u2=u;

%setup graph for plot 0 to 600
pdeseteq(2,'0.655','250','((-32000)+250).*(120)',(930).*(3450)','0:600','26','0.0','[0 100]')

%u = u1 + u2;
u=[u1 u2] ; % u is Matlab will use to plot
res=u;

```

```
%setupprop(pde_fig,'currparam',[930 ';' 3450 ';' 0.655 ';'(-32000)';250 ';'120 '])
```

```
%Plotflags and user data strings:
```

```
%setupprop(pde_fig,'plotflags',[1 1 1 1 1 1 6 1 0 0 0 6 1 1 0 0 0 0 1]);
```

```
%setupprop(pde_fig,'colstring',"");
```

```
%setupprop(pde_fig,'arrowstring',"");
```

```
%setupprop(pde_fig,'deformstring',"");
```

```
%setupprop(pde_fig,'heightstring',"");
```

```
%plot Graph
```

```
mypde_plot
```

โปรแกรมสนับสนุนการถ่ายโอนความร้อน1 (mypdeplot.m)

```
function pdeplot(res,time)

[pde_fig,ax]=pdeinit;
pdetool('appl_cb',9);
set(ax,'DataAspectRatio',[1 0.15 1]);
set(ax,'PlotBoxAspectRatio',[10 7 385]);
set(ax,'XLim',[-0.001 0.051]);
set(ax,'YLIM',[-0.0001 0.0051]);
set(ax,'XTickMode','auto');
set(ax,'YTickMode','auto');

%Geometry description:
pdirect([5e-005 0.051 1.5e-005 0.005],'R1');
set(findobj(get(pde_fig,'Children'),'Tag','PDEEval'),'String','R1')

%Boundary conditions:
pdetool('changemode',0)
pdesetbd(4,'dir',1,'1','120')
pdesetbd(3,'dir',1,'1','120')
pdesetbd(2,'dir',1,'1','120')
pdesetbd(1,'dir',1,'1','120')

%Mesh generation:
%setprop(pde_fig,'Hgrad',1.3);
%setprop(pde_fig,'refinemethod','regular');
pdetool('initmesh')
pdetool('refine')
pdetool('refine')
```

```
time=time+1;
u = res(1:401 , 1:time);
tt = NUM2STR(time);
tt= STRCAT('0:',tt);

pdeseteq(2,'0.119','250','((-4500)+250).*(120)',(930).*(2550)',tt,'26','0.0','[0 100]')

%setupprop(pde_fig,'currparam',[930 ';' 3450 ';' 0.22 ';'(-6000)';250 ';'120 '])
%Plotflags and user data strings:
%setupprop(pde_fig,'plotflags',[1 1 1 1 1 1 6 1 0 0 0 61 1 0 0 0 0 1]);
%setupprop(pde_fig,'colstring',"");
%setupprop(pde_fig,'arrowstring',"");
%setupprop(pde_fig,'deformstring',"");
%setupprop(pde_fig,'heightstring',"");

%plot Graph
mypde_plot
```

โปรแกรมสนับสนุนการถ่ายโอนความร้อน2 (mypde_solve.m)

```

bndhndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEBoundMenu');
bl=get(findobj(get(bndhndl,'Children'),'flat',...
    'Tag','PDEBoundMode'),'UserData');
dl1=getuprop(pde_fig,'dl1');

% Unpack parameters:
params=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEPDEMenu'),...
    'UserData');
ns=getuprop(pde_fig,'ncafd');
nc=ns(1); na=ns(2); nf=ns(3); nd=ns(4);
c=params(1:nc,:);
a=params(nc+1:nc+na,:);
f=params(nc+na+1:nc+na+nf,:);
d=params(nc+na+nf+1:nc+na+nf+nd,:);

pde_type=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEHelpMenu'),...
    'UserData');
h=findobj(get(pde_fig,'Children'),'flat','Tag','PDEMeshMenu');
hp=findobj(get(h,'Children'),'flat','Tag','PDEInitMesh');
p=get(hp,'UserData');
he=findobj(get(h,'Children'),'flat','Tag','PDERefine');
e=get(he,'UserData');
ht=findobj(get(h,'Children'),'flat','Tag','PDEMeshParam');
t=get(ht,'UserData');

solveparams=getuprop(pde_fig,'solveparam');
adaptflag=str2num(deblank(solveparams(1,:)));
nonlinflag=str2num(deblank(solveparams(7,:)));

```

```
nltol=str2num(deblank(solveparams(8,:)));
nlinit=deblank(solveparams(9,:));
jac=deblank(solveparams(10,:));
nlinnorm=lower(deblank(solveparams(11,:)));
if ~strcmp(nlinnorm,'energy'),
    nlinnorm=str2num(nlinnorm);
end
```

```
timepar=getuprop(pde_fig,'timeeigparam');
tlist=str2num(deblank(timepar(1,:)));
u0=deblank(timepar(2,:));
ut0=deblank(timepar(3,:));
r=str2num(deblank(timepar(4,:)));
rtol=str2num(deblank(timepar(5,:)));
atol=str2num(deblank(timepar(6,:)));
l=[];
u=parabolic(u0,tlist,b,l,p,e,t,c,a,f,d,rtol,atol);
```

โปรแกรมสนับสนุนการถ่ายโอนความร้อน3 (mypde_plot.m)

```

bndhdl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEBoundMenu');
bl=get(findobj(get(bndhdl,'Children'),'flat',...
    'Tag','PDEBoundMode'),'UserData');
dl1=getuprop(pde_fig,'dl1');

% Unpack parameters:
params=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEPDEMenu'),...
    'UserData');
ns=getuprop(pde_fig,'ncafd');
nc=ns(1); na=ns(2); nf=ns(3); nd=ns(4);
c=params(1:nc,:);
a=params(nc+1:nc+na,:);
f=params(nc+na+1:nc+na+nf,:);
d=params(nc+na+nf+1:nc+na+nf+nd,:);

pde_type=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEHelpMenu'),...
    'UserData');
h=findobj(get(pde_fig,'Children'),'flat','Tag','PDEMeshMenu');
hp=findobj(get(h,'Children'),'flat','Tag','PDEInitMesh');
p=get(hp,'UserData');
he=findobj(get(h,'Children'),'flat','Tag','PDERefine');
e=get(he,'UserData');
ht=findobj(get(h,'Children'),'flat','Tag','PDEMeshParam');
t=get(ht,'UserData');

solveparams=getuprop(pde_fig,'solveparam');
adaptflag=str2num(deblank(solveparams(1,:)));
nonlinflag=str2num(deblank(solveparams(7,:)));

```

```

nltol=str2num(deblank(solveparams(8,:)));
nlinit=deblank(solveparams(9,:));
jac=deblank(solveparams(10,:));
nlinnorm=lower(deblank(solveparams(11,:)));
if ~strcmp(nlinnorm,'energy'),
    nlinnorm=str2num(nlinnorm);
end

timepar=getuprop(pde_fig,'timeeigparam');
tlist=str2num(deblank(timepar(1,:)));
u0=deblank(timepar(2,:));
ut0=deblank(timepar(3,:));
r=str2num(deblank(timepar(4,:)));
rtol=str2num(deblank(timepar(5,:)));
atol=str2num(deblank(timepar(6,:)));
l=[];
% u=parabolic(u0,tlist,bl,p,e,t,c,a,f,d,rtol,atol);

% if no geometry, create a default L-shape:
pdegd=get(findobj(get(pde_fig,'Children'),'flat',...
    'Tag','PDEMeshMenu'),'UserData');
if isempty(pdegd), pdetool('membrane'), end

if btnstate(pde_fig,'zoom',1),
    pdezoom(pde_fig,'off')
    btnup(pde_fig,'zoom',1)
    opthndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEOptMenu');
    set(findobj(get(opthndl,'Children'),'flat','Tag','PDEZoom'),...
        'Checked','off')

```

```

end

flg_hndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEFileMenu');
flags=get(fl_g_hndl,'UserData');
flag1=flags(3);
if abs(flag1),
    pdetool('changemode',0)
end
flags=get(fl_g_hndl,'UserData');
if flags(3)=-1,
    % error in decsg
    return;
elseif ~flags(2),
    pdetool('cleanup')
end
flags=get(fl_g_hndl,'UserData');
flag2=flags(4);
if flag2,
    pdetool('initmesh')
end
flags=get(fl_g_hndl,'UserData');
oldmode=flags(2);
flags(2)=3;          % mode_flag=3
set(fl_g_hndl,'UserData',flags)

pdeinfo('Solving PDE...');
set(pde_fig,'Pointer','watch')

drawnow

```

```

% Save solution:
plothndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEPlotMenu');
set(plothndl,'UserData',u);
% save eigenvalues:
winhndl=findobj(get(pde_fig,'Children'),'flat','Tag','winmenu');
set(winhndl,'UserData',l);

% Enable export:
solvehndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDESolveMenu');
set(findobj(get(solvehndl,'Children'),'flat','Tag','PDEExpSol'),...
    'Enable','on')

% Set flags
flags=get(flag_hndl,'UserData');
flags(5)=0; flags(6)=1; flags(7)=0; % flag3=0, flag4=1, flag5=0
set(flag_hndl,'UserData',flags)

plotflags=getprop(pde_fig,'plotflags');
if pde_type==2 | pde_type==3,
    plotflags(12)=size(u,2);
else
    plotflags(12)=1;
end
setupprop(pde_fig,'plotflags',plotflags)

% Turn off replay of movie
animparams=getprop(pde_fig,'animparam');
animparams(3)=0;
setupprop(pde_fig,'animparam',animparams)

```

```

% Update plot dialog box:
pdeptdlg('initialize',1,getupprop(pde_fig,'plotstrings'));

% flag is set if we're solving from PDEPTDLG. The solution plot
% will be handled from PDEPTDLG.
%if plotflags(8) & ~isempty(u) & nargin==1,
    % do plot solution automatically:
    pdeptdlg('plot')
if adaptflag & (oldmode==2) & pde_type==1,
    % We're still displaying the old mesh; update it
    pdetool meshmode
else
    % Restore old mode since we are not plotting solution nor updating:
    flags=get(flg_hndl,'UserData');
    flags(2)=oldmode;
    set(flg_hndl,'UserData',flags)
end

set(pde_fig,'Pointer','arrow')
drawnow

if pde_type~=4,
    pdeinfo('Select a new plot, or change mode to alter PDE, mesh, or boundaries.');
```

การถ่ายโอนมวลสาร (การดูดซับน้ำมัน)

โปรแกรมหลัก (pdemodel_2.m)

```
%pdemodel_new

[pde_fig,ax]=pdeinit;
pdetool('appl_cb',10);
set(ax,'DataAspectRatio',[1 0.15 1]);
set(ax,'PlotBoxAspectRatio',[10 7 385]);
set(ax,'XLim',[-0.001 0.051]);
set(ax,'YLim',[-0.0001 0.0051]);
set(ax,'XTickMode','auto');
set(ax,'YTickMode','auto');

% Geometry description:
pdirect([5e-005 0.051 1.5e-005 0.005],'R1');
set(findobj(get(pde_fig,'Children'),'Tag','PDEEval'),'String','R1')

% Boundary conditions:
pdetool('changemode',0)
pdesetbd(4,'dir',1,'1','40')
pdesetbd(3,'dir',1,'1','40')
pdesetbd(2,'dir',1,'1','40')
pdesetbd(1,'dir',1,'1','40')

% Mesh generation:
setupprop(pde_fig,'Hgrad',1.3);
setupprop(pde_fig,'refinemethod','regular');
pdetool('initmesh')
pdetool('refine')
```

```

pdetool('refine')

% PDE coefficients:
pdeseteq(2,'0.0000000061','0.0','0.005','1.0','0:180','0.0','0.0',[0 100])
setupprop(pde_fig,'currparam',['0.0000000061';'0.005    '])

mypde_solve

u1=u;

% PDE coefficients mass2:
pdeseteq(2,'0.000000014','0.0','0.005','1.0','181:600','0.0','0.0',[0 100])
setupprop(pde_fig,'currparam',['0.000000014';'0.005    '])

mypde_solve

u2=u;

% PDE coefficients [DUMMY]:
pdeseteq(2,'0.000000014','0.0','0.005','1.0','0:600','0.0','0.0',[0 100])
setupprop(pde_fig,'currparam',['0.000000014';'0.005    '])

u=[u1 u2];

% Solve parameters:
setupprop(pde_fig,'solveparam',str2mat('0','1056','10','pdeadworst','0.5','longest','0','1e-
4',' ','fixed','inf'))

```

```
% Plotflags and user data strings:  
setupprop(pde_fig,'plotflags',[1 1 1 1 1 1 4 1 0 0 0 6 1 0 1 0 0 1]);  
setupprop(pde_fig,'colstring',"");  
setupprop(pde_fig,'arrowstring',"");  
setupprop(pde_fig,'deformstring',"");  
setupprop(pde_fig,'heightstring',"");  
  
% Solve PDE:  
% pde plot  
mypde_plot
```

การถ่ายโอนมวลสาร (การสูญเสียน้ำ)

โปรแกรมหลัก (pdemodel_3.m)

```
%pdemodel_new

[pde_fig,ax]=pdeinit;
pdetool('appl_cb',10);
set(ax,'DataAspectRatio',[1 0.15 1]);
set(ax,'PlotBoxAspectRatio',[10 7 385]);
set(ax,'XLim',[-0.001 0.051]);
set(ax,'YLim',[-0.0001 0.0051]);
set(ax,'XTickMode','auto');
set(ax,'YTickMode','auto');

% Geometry description:
pdirect([5e-005 0.051 1.5e-005 0.005],'R1');
set(findobj(get(pde_fig,'Children'),'Tag','PDEEval'),'String','R1')

% Boundary conditions:
pdetool('changemode',0)
pdesetbd(4,'dir',1,'1','3.45')
pdesetbd(3,'dir',1,'1','3.45')
pdesetbd(2,'dir',1,'1','3.45')
pdesetbd(1,'dir',1,'1','3.45')

% Mesh generation:
setupprop(pde_fig,'Hgrad',1.3);
setupprop(pde_fig,'refinethod','regular');
pdetool('initmesh')
```

```

pdetool('refine')
pdetool('refine')

% PDE coefficients:
pdeseteq(2,'0.0000000075','0.0','0.0','1.0','0:180','0.0','0.0','[0 100]')
setupprop(pde_fig,'currparam',['0.0000000075';'0.0    '])

mypde_solve

u1=u;

% PDE coefficients mass2:
pdeseteq(2,'0.0000000038','0.0','0.0','1.0','181:600','0.0','0.0','[0 100]')
setupprop(pde_fig,'currparam',['0.0000000038';'0.0    '])

mypde_solve

u2=u;

% PDE coefficients [DUMMY]:
pdeseteq(2,'0.0000000038','0.0','0.0','1.0','0:600','0.0','0.0','[0 100]')
setupprop(pde_fig,'currparam',['0.0000000038';'0.0    '])

u=[u1 u2];

% Solve parameters:
setupprop(pde_fig,'solveparam',str2mat('0','1056','10','pdeadworst','0.5','longest','0','1e-4','','fixed','inf'))

```

```
% Plotflags and user data strings:
setupprop(pde_fig,'plotflags',[1 1 1 1 1 1 4 1 0 0 0 6 1 0 1 0 0 1]);
setupprop(pde_fig,'colstring','');
setupprop(pde_fig,'arrowstring','');
setupprop(pde_fig,'deformstring','');
setupprop(pde_fig,'heightstring','');

% Solve PDE:
% pde plot
mypde_plot
```

โปรแกรมสนับสนุนการถ่ายโอนมวลสาร 1 (mypde_plot.m)

```

bndhndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEBoundMenu');
bl=get(findobj(get(bndhndl,'Children'),'flat',...
    'Tag','PDEBoundMode'),'UserData');
dl1=getuprop(pde_fig,'dl1');

% Unpack parameters:
params=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEPDEMenu'),...
    'UserData');
ns=getuprop(pde_fig,'ncafd');
nc=ns(1); na=ns(2); nf=ns(3); nd=ns(4);
c=params(1:nc,:);
a=params(nc+1:nc+na,:);
f=params(nc+na+1:nc+na+nf,:);
d=params(nc+na+nf+1:nc+na+nf+nd,:);

pde_type=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEHelpMenu'),...
    'UserData');
h=findobj(get(pde_fig,'Children'),'flat','Tag','PDEMeshMenu');
hp=findobj(get(h,'Children'),'flat','Tag','PDEInitMesh');
p=get(hp,'UserData');
he=findobj(get(h,'Children'),'flat','Tag','PDERefine');
e=get(he,'UserData');
ht=findobj(get(h,'Children'),'flat','Tag','PDEMeshParam');
t=get(ht,'UserData');

solveparams=getuprop(pde_fig,'solveparam');
adaptflag=str2num(deblank(solveparams(1,:)));
nonlinflag=str2num(deblank(solveparams(7,:)));

```

```

nltol=str2num(deblank(solveparams(8,:)));
nlinit=deblank(solveparams(9,:));
jac=deblank(solveparams(10,:));
nlinnorm=lower(deblank(solveparams(11,:)));
if ~strcmp(nlinnorm,'energy'),
    nlinnorm=str2num(nlinnorm);
end

timepar=getuprop(pde_fig,'timeeigparam');
tlist=str2num(deblank(timepar(1,:)));
u0=deblank(timepar(2,:));
ut0=deblank(timepar(3,:));
r=str2num(deblank(timepar(4,:)));
rtol=str2num(deblank(timepar(5,:)));
atol=str2num(deblank(timepar(6,:)));
l=[];

% u=parabolic(u0,tlist,bl,p,e,t,c,a,f,d,rtol,atol);

% if no geometry, create a default L-shape:
pdegd=get(findobj(get(pde_fig,'Children'),'flat',...
    'Tag','PDEMeshMenu'),'UserData');
if isempty(pdegd), pdetool('membrane'), end

if btnstate(pde_fig,'zoom',1),
    pdezoom(pde_fig,'off')
    btnup(pde_fig,'zoom',1)
    opthndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEOptMenu');

```

```

set(findobj(get(opthndl,'Children'),'flat','Tag','PDEZoom'),...
    'Checked','off')
end

flg_hndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEFileMenu');
flags=get(flg_hndl,'UserData');
flag1=flags(3);
if abs(flag1),
    pdetool('changemode',0)
end
flags=get(flg_hndl,'UserData');
if flags(3)==-1,
    % error in decsg
    return;
elseif ~flags(2),
    pdetool('cleanup')
end
flags=get(flg_hndl,'UserData');
flag2=flags(4);
if flag2,
    pdetool('initmesh')
end
flags=get(flg_hndl,'UserData');
oldmode=flags(2);
flags(2)=3;          % mode_flag=3
set(flg_hndl,'UserData',flags)

pdeinfo('Solving PDE...');
set(pde_fig,'Pointer','watch')

```

```
drawnow
```

```
% Save solution:
```

```
plothndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEPlotMenu');
```

```
set(plothndl,'UserData',u);
```

```
% save eigenvalues:
```

```
winhndl=findobj(get(pde_fig,'Children'),'flat','Tag','winmenu');
```

```
set(winhndl,'UserData',l);
```

```
% Enable export:
```

```
solvehndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDESolveMenu');
```

```
set(findobj(get(solvehndl,'Children'),'flat','Tag','PDEExpSol'),...
```

```
    'Enable','on')
```

```
% Set flags
```

```
flags=get(flghndl,'UserData');
```

```
flags(5)=0; flags(6)=1; flags(7)=0; % flag3=0, flag4=1, flag5=0
```

```
set(flghndl,'UserData',flags)
```

```
plotflags=getuprop(pde_fig,'plotflags');
```

```
if pde_type==2 | pde_type==3,
```

```
    plotflags(12)=size(u,2);
```

```
else
```

```
    plotflags(12)=1;
```

```
end
```

```
setuprop(pde_fig,'plotflags',plotflags)
```

```
% Turn off replay of movie
```

```
animparams=getuprop(pde_fig,'animparam');
```

```

animparams(3)=0;
setupprop(pde_fig,'animparam',animparams)

% Update plot dialog box:
pdeptdlg('initialize',1,getupprop(pde_fig,'plotstrings'));

% flag is set if we're solving from PDEPTDLG. The solution plot
% will be handled from PDEPTDLG.
%if plotflags(8) & ~isempty(u) & nargin==1,
% do plot solution automatically:
pdeptdlg('plot')
if adaptflag & (oldmode==2) & pde_type==1,
% We're still displaying the old mesh; update it
pdetool meshmode
else
% Restore old mode since we are not plotting solution nor updating:
flags=get(flg_hndl,'UserData');
flags(2)=oldmode;
set(flg_hndl,'UserData',flags)
end

set(pde_fig,'Pointer','arrow')
drawnow

if pde_type~=4,
pdeinfo('Select a new plot, or change mode to alter PDE, mesh, or boundaries. ');
end

```

โปรแกรมสนับสนุนการถ่ายโอนมวลสาร2 (mypde_solve.m)

```

bndhndl=findobj(get(pde_fig,'Children'),'flat','Tag','PDEBoundMenu');
bl=get(findobj(get(bndhndl,'Children'),'flat',...
    'Tag','PDEBoundMode'),'UserData');
dl1=getuprop(pde_fig,'dl1');

% Unpack parameters:
params=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEPDEMenu'),...
    'UserData');
ns=getuprop(pde_fig,'ncafd');
nc=ns(1); na=ns(2); nf=ns(3); nd=ns(4);
c=params(1:nc,:);
a=params(nc+1:nc+na,:);
f=params(nc+na+1:nc+na+nf,:);
d=params(nc+na+nf+1:nc+na+nf+nd,:);

pde_type=get(findobj(get(pde_fig,'Children'),'flat','Tag','PDEHelpMenu'),...
    'UserData');
h=findobj(get(pde_fig,'Children'),'flat','Tag','PDEMeshMenu');
hp=findobj(get(h,'Children'),'flat','Tag','PDEInitMesh');
p=get(hp,'UserData');
he=findobj(get(h,'Children'),'flat','Tag','PDERefine');
e=get(he,'UserData');
ht=findobj(get(h,'Children'),'flat','Tag','PDEMeshParam');
t=get(ht,'UserData');

solveparams=getuprop(pde_fig,'solveparam');
adaptflag=str2num(deblank(solveparams(1,:)));
nonlinflag=str2num(deblank(solveparams(7,:)));

```

```
nltol=str2num(deblank(solveparams(8,:)));
nlinit=deblank(solveparams(9,:));
jac=deblank(solveparams(10,:));
nlinnorm=lower(deblank(solveparams(11,:)));
if ~strcmp(nlinnorm,'energy'),
    nlinnorm=str2num(nlinnorm);
end
```

```
timepar=getuprop(pde_fig,'timeeigparam');
tlist=str2num(deblank(timepar(1,:)));
u0=deblank(timepar(2,:));
ut0=deblank(timepar(3,:));
r=str2num(deblank(timepar(4,:)));
rtol=str2num(deblank(timepar(5,:)));
atol=str2num(deblank(timepar(6,:)));
l=[];
```

```
u=parabolic(u0,tlist,bl,p,e,t,c,a,f,d,rtol,atol);
```