classdef COVERV2 < matlab.apps.AppBase

properties (Access = public)

UIFigure matlab.ui.Figure

Image matlab.ui.control.Image

Image2\_2 matlab.ui.control.Image

Image2\_3 matlab.ui.control.Image

Image2\_4 matlab.ui.control.Image

end

methods (Access = private)

function Image2\_3Clicked(app, event)

delete(app.UIFigure);

run fitting.mlapp;

end

function Image2\_2Clicked(app, event)

delete(app.UIFigure)

run dataprocessing.mlapp;

end

function Image2\_4Clicked(app, event)

delete(app.UIFigure);

run simulation.mlapp;

end

end

methods (Access = private)

function createComponents(app)

app.UIFigure = uifigure('Visible', 'off');

app.UIFigure.Position = [100 100 974 608];

app.UIFigure.Name = 'UI Figure';

app.Image = uiimage(app.UIFigure);

app.Image.Interruptible = 'off';

app.Image.Position = [1 -27 974 661];

app.Image.ImageSource = 'WXWorkCapture\_16777659933220.png';

app.Image2\_2 = uiimage(app.UIFigure);

app.Image2\_2.ImageClickedFcn = createCallbackFcn(app, @Image2\_2Clicked, true);

app.Image2\_2.Position = [731 214 170 129];

app.Image2\_2.ImageSource = 'simulogo.png';

app.Image2\_3 = uiimage(app.UIFigure);

app.Image2\_3.ImageClickedFcn = createCallbackFcn(app, @Image2\_3Clicked, true);

app.Image2\_3.Position = [714 85 211 127];

app.Image2\_3.ImageSource = 'modelfitting.png';

app.Image2\_4 = uiimage(app.UIFigure);

app.Image2\_4.ImageClickedFcn = createCallbackFcn(app, @Image2\_4Clicked, true);

app.Image2\_4.Position = [733 343 170 129];

app.Image2\_4.ImageSource = 'deivce simu.png';

app.UIFigure.Visible = 'on';

end

end

methods (Access = public)

function app = COVERV2

createComponents(app)

registerApp(app, app.UIFigure)

if nargout == 0

clear app

end

end

function delete(app)

delete(app.UIFigure)

end

end

end

classdef simulation < matlab.apps.AppBase

properties (Access = public)

UIFigure matlab.ui.Figure

TabGroup matlab.ui.container.TabGroup

tunnelingTab matlab.ui.container.Tab

tunnelingparametersPanel matlab.ui.container.Panel

Knob matlab.ui.control.Knob

Knob\_2 matlab.ui.control.Knob

Knob\_3 matlab.ui.control.Knob

egLabel matlab.ui.control.Label

egEditField matlab.ui.control.Spinner

grLabel matlab.ui.control.Label

grEditField matlab.ui.control.Spinner

glLabel matlab.ui.control.Label

glEditField matlab.ui.control.Spinner

voltagescalePanel matlab.ui.container.Panel

voltagestepEditFieldLabel matlab.ui.control.Label

voltagestepEditField matlab.ui.control.NumericEditField

Slider matlab.ui.control.Slider

voltagescaleLabel matlab.ui.control.Label

voltageEditField matlab.ui.control.Spinner

resultPanel matlab.ui.container.Panel

UIAxes matlab.ui.control.UIAxes

UIAxeslog matlab.ui.control.UIAxes

rectificationPanel matlab.ui.container.Panel

Slider\_2 matlab.ui.control.Slider

alphaLabel matlab.ui.control.Label

alpha05EditField matlab.ui.control.Spinner

SimuButton matlab.ui.control.Button

Image2 matlab.ui.control.Image

gatevoltagePanel matlab.ui.container.Panel

Slider\_7 matlab.ui.control.Slider

gatevoltageLabel matlab.ui.control.Label

voltageEditField\_8 matlab.ui.control.Spinner

gatingefficiencyEditFieldLabel matlab.ui.control.Label

gatingefficiencyEditField matlab.ui.control.NumericEditField

Image8 matlab.ui.control.Image

hoppingTab matlab.ui.container.Tab

hoppingparametersPanel\_2 matlab.ui.container.Panel

grEditField\_2Label matlab.ui.control.Label

grEditField\_2 matlab.ui.control.NumericEditField

glEditField\_2Label matlab.ui.control.Label

glEditField\_2 matlab.ui.control.NumericEditField

Knob\_4 matlab.ui.control.Knob

Knob\_5 matlab.ui.control.Knob

Knob\_7 matlab.ui.control.Knob

grEditField\_2Label\_2 matlab.ui.control.Label

grEditField\_2Label\_3 matlab.ui.control.Label

Knob\_8 matlab.ui.control.Knob

grEditField\_2Label\_4 matlab.ui.control.Label

grEditField\_2Label\_5 matlab.ui.control.Label

egLabel\_2 matlab.ui.control.Label

egEditField\_2 matlab.ui.control.Spinner

lambdaLabel matlab.ui.control.Label

lambdaEditField matlab.ui.control.Spinner

voltagescalePanel\_5 matlab.ui.container.Panel

stepEditField\_5Label matlab.ui.control.Label

stepEditField\_5 matlab.ui.control.NumericEditField

Slider\_3 matlab.ui.control.Slider

voltageLabel\_2 matlab.ui.control.Label

voltageEditField\_5 matlab.ui.control.Spinner

resultPanel\_5 matlab.ui.container.Panel

UIAxes\_5 matlab.ui.control.UIAxes

UIAxeslog\_5 matlab.ui.control.UIAxes

rectificationPanel\_3 matlab.ui.container.Panel

Slider\_4 matlab.ui.control.Slider

alphaLabel\_2 matlab.ui.control.Label

alpha05EditField\_3 matlab.ui.control.Spinner

SimuButton\_2 matlab.ui.control.Button

Image2\_5 matlab.ui.control.Image

gatevoltagePanel\_2 matlab.ui.container.Panel

Slider\_8 matlab.ui.control.Slider

gatevoltageLabel\_2 matlab.ui.control.Label

voltageEditField\_9 matlab.ui.control.Spinner

gatingefficiencyEditField\_2Label matlab.ui.control.Label

gatingefficiencyEditField\_2 matlab.ui.control.NumericEditField

Image8\_2 matlab.ui.control.Image

mixedtransportTab matlab.ui.container.Tab

hoppingchannelPanel matlab.ui.container.Panel

grEditField\_6Label matlab.ui.control.Label

grEditField\_6 matlab.ui.control.NumericEditField

glEditField\_3Label matlab.ui.control.Label

glEditField\_3 matlab.ui.control.NumericEditField

Knob\_9 matlab.ui.control.Knob

Knob\_10 matlab.ui.control.Knob

Knob\_11 matlab.ui.control.Knob

grEditField\_2Label\_6 matlab.ui.control.Label

grEditField\_2Label\_7 matlab.ui.control.Label

Knob\_12 matlab.ui.control.Knob

grEditField\_2Label\_8 matlab.ui.control.Label

grEditField\_2Label\_9 matlab.ui.control.Label

egLabel\_3 matlab.ui.control.Label

egEditField\_3 matlab.ui.control.Spinner

lambdaLabel\_2 matlab.ui.control.Label

lambdaEditField\_2 matlab.ui.control.Spinner

voltagescalePanel\_6 matlab.ui.container.Panel

stepEditField\_6Label matlab.ui.control.Label

stepEditField\_6 matlab.ui.control.NumericEditField

Slider\_5 matlab.ui.control.Slider

voltageLabel\_3 matlab.ui.control.Label

voltageEditField\_6 matlab.ui.control.Spinner

resultPanel\_6 matlab.ui.container.Panel

UIAxes\_6 matlab.ui.control.UIAxes

UIAxeslog\_6 matlab.ui.control.UIAxes

SimuButton\_3 matlab.ui.control.Button

Image2\_6 matlab.ui.control.Image

tunnelingchannelPanel matlab.ui.container.Panel

Knob\_13 matlab.ui.control.Knob

Knob\_14 matlab.ui.control.Knob

Knob\_15 matlab.ui.control.Knob

egLabel\_4 matlab.ui.control.Label

egEditField\_4 matlab.ui.control.Spinner

grLabel\_2 matlab.ui.control.Label

grEditField\_10 matlab.ui.control.Spinner

glLabel\_2 matlab.ui.control.Label

glEditField\_4 matlab.ui.control.Spinner

nonsteadystateTab matlab.ui.container.Tab

resultPanel\_7 matlab.ui.container.Panel

UIAxes\_7 matlab.ui.control.UIAxes

UIAxeslog\_7 matlab.ui.control.UIAxes

SimuButton\_4 matlab.ui.control.Button

Image2\_7 matlab.ui.control.Image

voltagescalePanel\_7 matlab.ui.container.Panel

stepEditField\_7Label matlab.ui.control.Label

stepEditField\_7 matlab.ui.control.NumericEditField

Slider\_6 matlab.ui.control.Slider

voltageLabel\_4 matlab.ui.control.Label

voltageEditField\_7 matlab.ui.control.Spinner

channel1Panel matlab.ui.container.Panel

grEditField\_11Label matlab.ui.control.Label

grEditField\_11 matlab.ui.control.NumericEditField

glEditField\_5Label matlab.ui.control.Label

glEditField\_5 matlab.ui.control.NumericEditField

Knob\_16 matlab.ui.control.Knob

Knob\_17 matlab.ui.control.Knob

Knob\_18 matlab.ui.control.Knob

grEditField\_2Label\_10 matlab.ui.control.Label

grEditField\_2Label\_11 matlab.ui.control.Label

Knob\_19 matlab.ui.control.Knob

grEditField\_2Label\_12 matlab.ui.control.Label

grEditField\_2Label\_13 matlab.ui.control.Label

egLabel\_5 matlab.ui.control.Label

egEditField\_5 matlab.ui.control.Spinner

lambdaLabel\_3 matlab.ui.control.Label

lambdaEditField\_3 matlab.ui.control.Spinner

channel2Panel matlab.ui.container.Panel

grEditField\_14Label matlab.ui.control.Label

grEditField\_14 matlab.ui.control.NumericEditField

glEditField\_6Label matlab.ui.control.Label

glEditField\_6 matlab.ui.control.NumericEditField

Knob\_20 matlab.ui.control.Knob

Knob\_21 matlab.ui.control.Knob

Knob\_22 matlab.ui.control.Knob

grEditField\_2Label\_14 matlab.ui.control.Label

grEditField\_2Label\_15 matlab.ui.control.Label

Knob\_23 matlab.ui.control.Knob

grEditField\_2Label\_16 matlab.ui.control.Label

grEditField\_2Label\_17 matlab.ui.control.Label

egLabel\_6 matlab.ui.control.Label

egEditField\_6 matlab.ui.control.Spinner

lambdaLabel\_4 matlab.ui.control.Label

lambdaEditField\_4 matlab.ui.control.Spinner

kneticparametersPanel matlab.ui.container.Panel

Knob\_26 matlab.ui.control.Knob

knLabel matlab.ui.control.Label

kn matlab.ui.control.Spinner

scanrateLabel matlab.ui.control.Label

scanrate matlab.ui.control.Spinner

kpLabel matlab.ui.control.Label

kp matlab.ui.control.Spinner

protonLabel matlab.ui.control.Label

proton matlab.ui.control.Spinner

Knob\_27 matlab.ui.control.Knob

grEditField\_2Label\_18 matlab.ui.control.Label

Knob\_28 matlab.ui.control.Knob

grEditField\_2Label\_19 matlab.ui.control.Label

Knob\_29 matlab.ui.control.Knob

thermoelectricTab matlab.ui.container.Tab

tunnelingparametersPanel\_2 matlab.ui.container.Panel

Knob\_30 matlab.ui.control.Knob

Knob\_31 matlab.ui.control.Knob

Knob\_32 matlab.ui.control.Knob

egLabel\_7 matlab.ui.control.Label

egEditField\_7 matlab.ui.control.Spinner

grLabel\_3 matlab.ui.control.Label

grEditField\_20 matlab.ui.control.Spinner

glLabel\_3 matlab.ui.control.Label

glEditField\_7 matlab.ui.control.Spinner

voltagescalePanel\_8 matlab.ui.container.Panel

voltagestepEditField\_2Label matlab.ui.control.Label

voltagestepEditField\_2 matlab.ui.control.NumericEditField

Slider\_9 matlab.ui.control.Slider

voltagescaleLabel\_2 matlab.ui.control.Label

voltageEditField\_10 matlab.ui.control.Spinner

resultPanel\_8 matlab.ui.container.Panel

UIAxes\_8 matlab.ui.control.UIAxes

UIAxeslog\_8 matlab.ui.control.UIAxes

zerobiasthermocurrentPanel matlab.ui.container.Panel

Slider\_13 matlab.ui.control.Slider

TdifferenceLabel matlab.ui.control.Label

alpha05EditField\_7 matlab.ui.control.Spinner

leftelectrodeLabel matlab.ui.control.Label

alpha05EditField\_8 matlab.ui.control.Spinner

Slider\_14 matlab.ui.control.Slider

SimuButton\_5 matlab.ui.control.Button

Image2\_8 matlab.ui.control.Image

electrodetemperaturePanel matlab.ui.container.Panel

Slider\_11 matlab.ui.control.Slider

leftLabel matlab.ui.control.Label

alpha05EditField\_5 matlab.ui.control.Spinner

rightLabel matlab.ui.control.Label

alpha05EditField\_6 matlab.ui.control.Spinner

Slider\_12 matlab.ui.control.Slider

homeButton matlab.ui.control.Button

Image3 matlab.ui.control.Image

Image5 matlab.ui.control.Image

end

methods (Access = private)

function homeButtonPushed(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

function Image5Clicked(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

function KnobValueChanging(app, event)

changingValue = event.Value;

end

function KnobValueChanged(app, event)

value = app.Knob.Value;

app.Knob.Value=roundn(value,-2);

app.egEditField.Value=app.Knob.Value;

end

function Knob\_2ValueChanged(app, event)

value = app.Knob\_2.Value;

app.Knob\_2.Value=roundn(value,-3);

app.grEditField.Value=app.Knob\_2.Value;

end

function Knob\_3ValueChanged(app, event)

value = app.Knob\_3.Value;

app.Knob\_3.Value=roundn(value,-3);

app.glEditField.Value=app.Knob\_3.Value;

end

function SliderValueChanged(app, event)

value = app.Slider.Value;

app.Slider.Value=roundn(value,-1);

app.voltageEditField.Value=app.Slider.Value;

end

function Slider\_2ValueChanged(app, event)

value = app.Slider\_2.Value;

app.Slider\_2.Value=roundn(value,-1);

app.alpha05EditField.Value=app.Slider\_2.Value;

end

function Knob\_5ValueChanged(app, event)

value = app.Knob\_5.Value;

app.Knob\_5.Value=roundn(value,-1);

app.grEditField\_2.Value=10^app.Knob\_5.Value;

end

function SimuButtonPushed(app, event)

app.UIAxes.cla;

app.UIAxeslog.cla;

poi = app.voltagestepEditField.Value +1;

Vh1=linspace(0,app.voltageEditField.Value,poi);

Vh4=linspace(-app.voltageEditField.Value,0,poi);

Vh0 = [Vh4,Vh1];

for iV=1:2\*poi

result1tunneling=tunnelingchannel(app.egEditField.Value,app.voltageEditField\_8.Value\*app.gatingefficiencyEditField.Value\*0.01,app.grEditField.Value,app.glEditField.Value,Vh0(iV),app.alpha05EditField.Value,300 );

Vtunneling(iV)=result1tunneling(1);

Itunneling(iV)=result1tunneling(2);

end

plot(app.UIAxes,Vh0,Itunneling,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes,"on");

xlabel(app.UIAxes,'Voltage/V','fontsize',18)

ylabel(app.UIAxes,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes,"off");

plot(app.UIAxeslog,Vh0,log10(abs(Itunneling)),'Color',[11/255 7/255 137/255],'LineWidth',3);

xlabel(app.UIAxeslog,'Voltage/V','fontsize',18)

ylabel(app.UIAxeslog,'Log|\itI|','fontsize',18)

set(gca,'FontSize',18);

end

function SimuButton\_2Pushed(app, event)

app.UIAxes\_5.cla;

app.UIAxeslog\_5.cla;

poi = app.stepEditField\_5.Value +1;

Vh1=linspace(0,app.voltageEditField\_5.Value,poi);

Vh4=linspace(-app.voltageEditField\_5.Value,0,poi);

Vh0 = [Vh4,Vh1];

for iV=1:2\*poi

result1hopping=hoppingchannel(app.egEditField\_2.Value,app.lambdaEditField.Value,app.grEditField\_2.Value\*10^13,app.glEditField\_2.Value\*10^13,Vh0(iV),app.voltageEditField\_9.Value\*app.gatingefficiencyEditField\_2.Value\*0.01,app.alpha05EditField\_3.Value,300 );

Vhopping(iV)=result1hopping(1);

Ihopping(iV)=result1hopping(2);

mm1hopping(iV)=result1hopping(4);

mm2hopping(iV)=result1hopping(3);

end

plot(app.UIAxes\_5,Vh0,Ihopping,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes\_5,"on");

xlabel(app.UIAxes\_5,'Voltage/V','fontsize',18)

ylabel(app.UIAxes\_5,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes\_5,"off");

plot(app.UIAxeslog\_5,Vh0,log10(abs(Ihopping)),'Color',[11/255 7/255 137/255],'LineWidth',3);

xlabel(app.UIAxeslog\_5,'Voltage/V','fontsize',18)

ylabel(app.UIAxeslog\_5,'Log|\itI|','fontsize',18)

set(gca,'FontSize',18);

end

function Knob\_4ValueChanged(app, event)

value = app.Knob\_4.Value;

app.Knob\_4.Value=roundn(value,-2);

app.egEditField\_2.Value=app.Knob\_4.Value;

end

function Knob\_8ValueChanged(app, event)

value = app.Knob\_8.Value;

app.Knob\_8.Value=roundn(value,-1);

app.glEditField\_2.Value=10^app.Knob\_8.Value;

end

function Knob\_7ValueChanged(app, event)

value = app.Knob\_7.Value;

app.Knob\_7.Value=roundn(value,-2);

app.lambdaEditField.Value=app.Knob\_7.Value;

end

function Slider\_3ValueChanged(app, event)

value = app.Slider\_3.Value;

app.Slider\_3.Value=roundn(value,-1);

app.voltageEditField\_5.Value= app.Slider\_3.Value;

end

function Slider\_4ValueChanged(app, event)

value = app.Slider\_4.Value;

app.Slider\_4.Value=roundn(value,-1);

app.alpha05EditField\_3.Value= app.Slider\_4.Value;

end

function Knob\_9ValueChanged(app, event)

value = app.Knob\_9.Value;

app.Knob\_9.Value=roundn(value,-2);

app.egEditField\_3.Value= app.Knob\_9.Value;

end

function Knob\_10ValueChanged(app, event)

value = app.Knob\_10.Value;

app.Knob\_10.Value=roundn(value,-1);

app.grEditField\_6.Value = 10^app.Knob\_10.Value;

end

function Knob\_12ValueChanged(app, event)

value = app.Knob\_12.Value;

app.Knob\_12.Value=roundn(value,-1);

app.glEditField\_3.Value= 10^app.Knob\_12.Value;

end

function Knob\_11ValueChanged(app, event)

value = app.Knob\_11.Value;

app.Knob\_11.Value=roundn(value,-2);

app.lambdaEditField\_2.Value=app.Knob\_11.Value;

end

function Knob\_13ValueChanged(app, event)

value = app.Knob\_13.Value;

app.Knob\_13.Value=roundn(value,-2);

app.egEditField\_4.Value=app.Knob\_13.Value;

end

function Knob\_14ValueChanged(app, event)

value = app.Knob\_14.Value;

app.Knob\_14.Value=roundn(value,-3);

app.grEditField\_10.Value=app.Knob\_14.Value;

end

function Knob\_15ValueChanged(app, event)

value = app.Knob\_15.Value;

app.Knob\_15.Value=roundn(value,-3);

app.glEditField\_4.Value = app.Knob\_15.Value;

end

function Slider\_5ValueChanged(app, event)

value = app.Slider\_5.Value;

app.Slider\_5.Value=roundn(value,-1);

app.voltageEditField\_6.Value= app.Slider\_5.Value;

end

function SimuButton\_3Pushed(app, event)

app.UIAxes\_6.cla;

app.UIAxeslog\_6.cla;

poi = app.stepEditField\_6.Value +1;

Vh1=linspace(0,app.voltageEditField\_6.Value,poi);

Vh4=linspace(-app.voltageEditField\_6.Value,0,poi);

Vh0 = [Vh4,Vh1];

for iV=1:2\*poi

result1tunneling1=tunnelingchannel(app.egEditField\_4.Value,0,app.grEditField\_10.Value,app.glEditField\_4.Value,Vh0(iV),0.5,300 );

Vtunneling1(iV)=result1tunneling1(1);

Itunneling1(iV)=result1tunneling1(2);

result1hopping1=hoppingchannel(app.egEditField\_3.Value,app.lambdaEditField\_2.Value,app.grEditField\_6.Value\*10^13,app.glEditField\_3.Value\*10^13,Vh0(iV),0,0.5,300 );

Vhopping1(iV)=result1hopping1(1);

Ihopping1(iV)=result1hopping1(2);

end

plot(app.UIAxes\_6,Vh0,Itunneling1+Ihopping1,'LineWidth',3);

hold(app.UIAxes\_6,"on");

plot(app.UIAxes\_6,Vh0,Itunneling1,'Linestyle',':','Color','r','LineWidth',1.5);

hold(app.UIAxes\_6,"on");

plot(app.UIAxes\_6,Vh0,Ihopping1,'Color','b','Linestyle','--','LineWidth',1.5);

legend(app.UIAxes\_6,{'Itotal','Itunneling','Ihopping'})

xlabel(app.UIAxes\_6,'Voltage/V','fontsize',18)

ylabel(app.UIAxes\_6,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes\_6,"off");

plot(app.UIAxeslog\_6,Vh0,log10(abs(Itunneling1+Ihopping1)),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxeslog\_6,"on");

plot(app.UIAxeslog\_6,Vh0,log10(abs(Itunneling1)),'Linestyle',':','Color','r','LineWidth',1.5);

hold(app.UIAxeslog\_6,"on");

plot(app.UIAxeslog\_6,Vh0,log10(abs(Ihopping1)),'Color','b','Linestyle','--','LineWidth',1.5);

legend(app.UIAxeslog\_6,{'Itotal','Itunneling','Ihopping'})

xlabel(app.UIAxeslog\_6,'Voltage/V','fontsize',18)

ylabel(app.UIAxeslog\_6,'Log|\itI|','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes\_6,"off");

end

function Slider\_7ValueChanged(app, event)

value = app.Slider\_7.Value;

app.Slider\_7.Value=roundn(value,-2);

app.voltageEditField\_8.Value=app.Slider\_7.Value;

end

function Slider\_8ValueChanged(app, event)

value = app.Slider\_8.Value;

app.Slider\_8.Value=roundn(value,-2);

app.voltageEditField\_9.Value=app.Slider\_8.Value;

end

function Image8Clicked(app, event)

fig = uifigure;

message = {['The 0V gate voltage is seen as two terminal device simulating. ' ...

'The gating efficiency here is defined as the effective voltage drop on the molecular']};

uialert(fig,message,'gating voltage','Icon','question');

end

function Image8\_2Clicked(app, event)

fig = uifigure;

message = {['The 0V gate voltage is seen as two terminal device simulating. ' ...

'The gating efficiency here is defined as the effective voltage drop on the molecular']};

uialert(fig,message,'gating voltage','Icon','question');

end

function Knob\_16ValueChanged(app, event)

value = app.Knob\_16.Value;

app.Knob\_16.Value=roundn(value,-2);

app.egEditField\_5.Value=app.Knob\_16.Value;

end

function Knob\_17ValueChanged(app, event)

value = app.Knob\_17.Value;

app.Knob\_17.Value=roundn(value,-1);

app.grEditField\_11.Value=10^app.Knob\_17.Value;

end

function Knob\_21ValueChanged(app, event)

value = app.Knob\_21.Value;

app.Knob\_21.Value=roundn(value,-1);

app.grEditField\_14.Value=10^app.Knob\_21.Value;

end

function Knob\_20ValueChanged(app, event)

value = app.Knob\_20.Value;

app.Knob\_20.Value=roundn(value,-2);

app.egEditField\_6.Value=app.Knob\_20.Value;

end

function Knob\_19ValueChanged(app, event)

value = app.Knob\_19.Value;

app.Knob\_19.Value=roundn(value,-1);

app.glEditField\_5.Value=10^app.Knob\_19.Value;

end

function Knob\_23ValueChanged(app, event)

value = app.Knob\_23.Value;

app.Knob\_23.Value=roundn(value,-1);

app.glEditField\_6.Value=10^app.Knob\_23.Value;

end

function Knob\_18ValueChanged(app, event)

value = app.Knob\_18.Value;

app.Knob\_18.Value=roundn(value,-2);

app.lambdaEditField\_3.Value=app.Knob\_18.Value;

end

function Knob\_22ValueChanged(app, event)

value = app.Knob\_22.Value;

app.Knob\_22.Value=roundn(value,-2);

app.lambdaEditField\_4.Value=app.Knob\_22.Value;

end

function Knob\_27ValueChanged(app, event)

value = app.Knob\_27.Value;

app.Knob\_27.Value=roundn(value,-1);

app.kn.Value=10^app.Knob\_27.Value;

end

function Knob\_28ValueChanged(app, event)

value = app.Knob\_28.Value;

app.Knob\_28.Value=roundn(value,-1);

app.kp.Value=10^app.Knob\_28.Value;

end

function Knob\_29ValueChanged(app, event)

value = app.Knob\_29.Value;

app.Knob\_29.Value=roundn(value,-1);

app.proton.Value=10^app.Knob\_29.Value;

end

function Knob\_26ValueChanged(app, event)

value = app.Knob\_26.Value;

app.Knob\_26.Value=roundn(value,-1);

app.scanrate.Value=10^app.Knob\_26.Value;

end

function Slider\_6ValueChanged(app, event)

value = app.Slider\_6.Value;

app.Slider\_6.Value=roundn(value,-1);

app.voltageEditField\_7.Value= app.Slider\_6.Value;

end

function kpValueChanged(app, event)

value = app.kp.Value;

end

function SimuButton\_4Pushed(app, event)

app.UIAxes\_7.cla;

app.UIAxeslog\_7.cla;

poi = app.stepEditField\_7.Value\*app.voltageEditField\_7.Value+1;

Vh1=linspace(0,app.voltageEditField\_7.Value,poi);

Vh4=linspace(-app.voltageEditField\_7.Value,0,poi);

Vh0 = [Vh4,Vh1];

for iV=1:2\*poi

result1=hoppingchannel(app.egEditField\_5.Value,app.lambdaEditField\_3.Value,app.grEditField\_11.Value,app.glEditField\_5.Value,Vh0(iV),0,0.5,300 );

V(iV)=result1(1);

I1(iV)=result1(2);

mm1(iV)=result1(4);

mm2(iV)=result1(3);

end

for iV=1:2\*poi

result2=hoppingchannel(app.egEditField\_6.Value,app.lambdaEditField\_4.Value,app.grEditField\_14.Value,app.glEditField\_6.Value,Vh0(iV),0,0.5,300 );

V(iV)=result2(1);

I2(iV)=result2(2);

nn1(iV)=result2(4);

nn2(iV)=result2(3);

end

kpp=app.kp.Value\*app.proton.Value;

AMOUNT=knetic(app.voltageEditField\_7.Value, app.scanrate.Value,app.kn.Value,kpp,mm1,mm2,nn1,nn2,I1,I2);

Vhall=AMOUNT(:,1);

AQ=AMOUNT(:,2);

HAQ=AMOUNT(:,3);

CurrentsAQ=AMOUNT(:,4);

CurrentsHAQ=AMOUNT(:,5);

Currents=AMOUNT(:,6);

plot(app.UIAxes\_7,Vhall(1:poi,1),Currents(1:poi,1),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes\_7,"on");

plot(app.UIAxes\_7,Vhall(poi+1:2\*poi,1),Currents(poi+1:2\*poi,1),':','Color',[114/255 0 128/255],'linewidth',3)

hold(app.UIAxes\_7,"on");

plot(app.UIAxes\_7,Vhall(2\*poi+1:3\*poi,1),Currents(2\*poi+1:3\*poi,1),'Color',[11/255 7/255 137/255],'linewidth',3)

hold(app.UIAxes\_7,"on");

plot(app.UIAxes\_7,Vhall(3\*poi+1:4\*poi,1),Currents(3\*poi+1:4\*poi,1),':','Color',[114/255 0 128/255],'linewidth',3)

xlabel(app.UIAxes\_7,'Voltage/V','fontsize',18)

ylabel(app.UIAxes\_7,'\itI/','fontsize',18)

legend(app.UIAxes\_7,{'Forward','Reverse'},'FontSize',6);

set(gca,'FontSize',18);

hold(app.UIAxes\_7,"off");

plot(app.UIAxeslog\_7,Vhall(1:poi,1),log10(abs(Currents(1:poi,1))),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxeslog\_7,"on");

plot(app.UIAxeslog\_7,Vhall(poi+1:2\*poi,1),log10(abs(Currents(poi+1:2\*poi,1))),':','Color',[114/255 0 128/255],'linewidth',3)

hold(app.UIAxeslog\_7,"on");

plot(app.UIAxeslog\_7,Vhall(2\*poi+1:3\*poi,1),log10(abs(Currents(2\*poi+1:3\*poi,1))),'Color',[11/255 7/255 137/255],'linewidth',3)

hold(app.UIAxeslog\_7,"on");

plot(app.UIAxeslog\_7,Vhall(3\*poi+1:4\*poi,1),log10(abs(Currents(3\*poi+1:4\*poi,1))),':','Color',[114/255 0 128/255],'linewidth',3)

xlabel(app.UIAxeslog\_7,'Voltage/V','fontsize',18)

ylabel(app.UIAxeslog\_7,'Log|\itI|','fontsize',18)

legend(app.UIAxeslog\_7,{'Forward','Reverse'},'FontSize',6);

set(gca,'FontSize',18);

end

function Knob\_30ValueChanged(app, event)

value = app.Knob\_30.Value;

app.Knob\_30.Value=roundn(value,-2);

app.egEditField\_7.Value=app.Knob\_30.Value;

end

function Knob\_31ValueChanged(app, event)

value = app.Knob\_31.Value;

app.Knob\_31.Value=roundn(value,-3);

app.grEditField\_20.Value=app.Knob\_31.Value;

end

function Knob\_32ValueChanged(app, event)

value = app.Knob\_32.Value;

app.Knob\_32.Value=roundn(value,-3);

app.glEditField\_7.Value=app.Knob\_32.Value;

end

function Slider\_9ValueChanged(app, event)

value = app.Slider\_9.Value;

app.Slider\_9.Value=roundn(value,-1);

app.voltageEditField\_10.Value=app.Slider\_9.Value;

end

function Slider\_10ValueChanged(app, event)

value = app.Slider\_10.Value;

app.Slider\_10.Value=roundn(value,-1);

app.alpha05EditField\_4.Value= app.Slider\_10.Value;

end

function SimuButton\_5Pushed(app, event)

app.UIAxes\_8.cla;

app.UIAxeslog\_8.cla;

poi = app.voltagestepEditField\_2.Value\*app.voltageEditField\_10.Value+1;

Vh1=linspace(0,app.voltageEditField\_10.Value,poi);

Vh4=linspace(-app.voltageEditField\_10.Value,0,poi);

Vh0 = [Vh4,Vh1];

e=1.60217\*(10^(-19));

h=6.62607004\*(10^(-34));

hbar=h/(2\*pi);

kB=0.000086;

kTl=kB\*app.alpha05EditField\_5.Value;

kTr=kB\*app.alpha05EditField\_6.Value;

g1=app.grEditField\_20.Value;

g2=app.glEditField\_7.Value;

g=g1+g2;

Eg=app.egEditField\_7.Value;

u=0;

alpha=0.5;

NE=16001;

E=linspace(-8,8,NE);

dE=E(2)-E(1);

D=(g/(2\*pi))./(((E-(Eg+u)).^2)+((g/2)^2));

D=D./(dE\*sum(D));

for iV=1:2\*poi

UL=(alpha\*Vh0(iV));

UR=((1-alpha)\*Vh0(iV));

f1=1./(1+exp((E+UL)./kTl));

f2=1./(1+exp((E-UR)./kTr));

current(iV)=-dE\*e\*e/h\*(sum(D.\*(f1-f2)))\*2\*pi\*(g1\*g2/g);

end

poiT = 2\*app.alpha05EditField\_7.Value+1;

VhT0 =linspace(app.alpha05EditField\_8.Value-app.alpha05EditField\_7.Value,app.alpha05EditField\_8.Value+app.alpha05EditField\_7.Value,poiT);

kTTl=kB\*app.alpha05EditField\_8.Value;

VhT1=linspace(-app.alpha05EditField\_7.Value,app.alpha05EditField\_7.Value,poiT);

for iVT=1:poiT

kTTr=kB\*VhT0(iVT);

UL=0;

UR=0;

f1T=1./(1+exp((E+UL)./kTTl));

f2T=1./(1+exp((E-UR)./kTTr));

currentT(iVT)=-dE\*e\*e/h\*(sum(D.\*(f1T-f2T)))\*2\*pi\*(g1\*g2/g);

end

plot(app.UIAxes\_8,Vh0,current,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes\_8,"on");

xlabel(app.UIAxes\_8,'Voltage/V','fontsize',18)

ylabel(app.UIAxes\_8,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes\_8,"off");

plot(app.UIAxeslog\_8,VhT1,currentT,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxeslog\_8,"on");

xlabel(app.UIAxeslog\_8,'Temperature Difference/K','fontsize',18)

ylabel(app.UIAxeslog\_8,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxeslog\_8,"off");

end

function Slider\_11ValueChanged(app, event)

value = app.Slider\_11.Value;

app.Slider\_11.Value=roundn(value,-1);

app.alpha05EditField\_5.Value= app.Slider\_11.Value;

end

function Slider\_12ValueChanged(app, event)

value = app.Slider\_12.Value;

app.Slider\_12.Value=roundn(value,-1);

app.alpha05EditField\_6.Value= app.Slider\_12.Value;

end

function Slider\_13ValueChanged(app, event)

value = app.Slider\_13.Value;

app.Slider\_13.Value=roundn(value,0);

app.alpha05EditField\_8.Value= app.Slider\_13.Value;

end

function Slider\_14ValueChanged(app, event)

value = app.Slider\_14.Value;

app.Slider\_14.Value=roundn(value,0);

app.alpha05EditField\_7.Value= app.Slider\_14.Value;

end

end

methods (Access = private)

function createComponents(app)

app.UIFigure = uifigure('Visible', 'off');

app.UIFigure.Color = [1 1 1];

app.UIFigure.Position = [100 100 1051 721];

app.UIFigure.Name = 'UI Figure';

app.TabGroup = uitabgroup(app.UIFigure);

app.TabGroup.Position = [1 100 1051 622];

app.tunnelingTab = uitab(app.TabGroup);

app.tunnelingTab.Title = 'tunneling';

app.tunnelingTab.BackgroundColor = [1 1 1];

app.tunnelingparametersPanel = uipanel(app.tunnelingTab);

app.tunnelingparametersPanel.BorderType = 'none';

app.tunnelingparametersPanel.Title = 'tunneling parameters';

app.tunnelingparametersPanel.BackgroundColor = [1 1 1];

app.tunnelingparametersPanel.FontWeight = 'bold';

app.tunnelingparametersPanel.Position = [1 379 534 218];

app.Knob = uiknob(app.tunnelingparametersPanel, 'continuous');

app.Knob.Limits = [0 1];

app.Knob.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob.ValueChangedFcn = createCallbackFcn(app, @KnobValueChanged, true);

app.Knob.ValueChangingFcn = createCallbackFcn(app, @KnobValueChanging, true);

app.Knob.Position = [35 39 72 72];

app.Knob.Value = 0.5;

app.Knob\_2 = uiknob(app.tunnelingparametersPanel, 'continuous');

app.Knob\_2.Limits = [0 0.1];

app.Knob\_2.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_2.ValueChangedFcn = createCallbackFcn(app, @Knob\_2ValueChanged, true);

app.Knob\_2.Position = [207 39 72 72];

app.Knob\_2.Value = 0.005;

app.Knob\_3 = uiknob(app.tunnelingparametersPanel, 'continuous');

app.Knob\_3.Limits = [0 0.1];

app.Knob\_3.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_3.ValueChangedFcn = createCallbackFcn(app, @Knob\_3ValueChanged, true);

app.Knob\_3.Position = [386 39 72 72];

app.Knob\_3.Value = 0.005;

app.egLabel = uilabel(app.tunnelingparametersPanel);

app.egLabel.HorizontalAlignment = 'right';

app.egLabel.Position = [19 141 25 22];

app.egLabel.Text = 'eg';

app.egEditField = uispinner(app.tunnelingparametersPanel);

app.egEditField.Step = 0.001;

app.egEditField.Limits = [0 5];

app.egEditField.Position = [53 140 66 22];

app.egEditField.Value = 0.5;

app.grLabel = uilabel(app.tunnelingparametersPanel);

app.grLabel.HorizontalAlignment = 'right';

app.grLabel.Position = [193 142 25 22];

app.grLabel.Text = 'gr';

app.grEditField = uispinner(app.tunnelingparametersPanel);

app.grEditField.Step = 0.001;

app.grEditField.Limits = [0.001 5];

app.grEditField.Position = [227 141 66 22];

app.grEditField.Value = 0.005;

app.glLabel = uilabel(app.tunnelingparametersPanel);

app.glLabel.HorizontalAlignment = 'right';

app.glLabel.Position = [372 141 25 22];

app.glLabel.Text = 'gl';

app.glEditField = uispinner(app.tunnelingparametersPanel);

app.glEditField.Step = 0.001;

app.glEditField.Limits = [0.001 5];

app.glEditField.Position = [406 140 66 22];

app.glEditField.Value = 0.005;

app.voltagescalePanel = uipanel(app.tunnelingTab);

app.voltagescalePanel.BorderType = 'none';

app.voltagescalePanel.Title = 'voltage scale';

app.voltagescalePanel.BackgroundColor = [1 1 1];

app.voltagescalePanel.FontWeight = 'bold';

app.voltagescalePanel.Position = [1 276 534 94];

app.voltagestepEditFieldLabel = uilabel(app.voltagescalePanel);

app.voltagestepEditFieldLabel.HorizontalAlignment = 'right';

app.voltagestepEditFieldLabel.Position = [6 10 72 22];

app.voltagestepEditFieldLabel.Text = 'voltage step';

app.voltagestepEditField = uieditfield(app.voltagescalePanel, 'numeric');

app.voltagestepEditField.Position = [94 10 100 22];

app.voltagestepEditField.Value = 100;

app.Slider = uislider(app.voltagescalePanel);

app.Slider.Limits = [0 5];

app.Slider.ValueChangedFcn = createCallbackFcn(app, @SliderValueChanged, true);

app.Slider.Position = [227 47 251 3];

app.Slider.Value = 1.5;

app.voltagescaleLabel = uilabel(app.voltagescalePanel);

app.voltagescaleLabel.HorizontalAlignment = 'right';

app.voltagescaleLabel.Position = [0 45 79 22];

app.voltagescaleLabel.Text = 'voltage scale';

app.voltageEditField = uispinner(app.voltagescalePanel);

app.voltageEditField.Step = 0.1;

app.voltageEditField.Limits = [0 5];

app.voltageEditField.Position = [93 44 109 22];

app.voltageEditField.Value = 1.5;

app.resultPanel = uipanel(app.tunnelingTab);

app.resultPanel.BorderType = 'none';

app.resultPanel.Title = 'result';

app.resultPanel.BackgroundColor = [1 1 1];

app.resultPanel.FontWeight = 'bold';

app.resultPanel.Position = [543 1 400 596];

app.UIAxes = uiaxes(app.resultPanel);

title(app.UIAxes, '')

xlabel(app.UIAxes, 'Voltage/V')

ylabel(app.UIAxes, 'I/A')

app.UIAxes.PlotBoxAspectRatio = [1.8855421686747 1 1];

app.UIAxes.TitleFontWeight = 'bold';

app.UIAxes.BackgroundColor = [1 1 1];

app.UIAxes.Position = [1 299 391 278];

app.UIAxeslog = uiaxes(app.resultPanel);

title(app.UIAxeslog, '')

xlabel(app.UIAxeslog, 'Voltage/V')

ylabel(app.UIAxeslog, 'Log(I)')

app.UIAxeslog.PlotBoxAspectRatio = [1.86309523809524 1 1];

app.UIAxeslog.TitleFontWeight = 'bold';

app.UIAxeslog.BackgroundColor = [1 1 1];

app.UIAxeslog.Position = [2 12 391 288];

app.rectificationPanel = uipanel(app.tunnelingTab);

app.rectificationPanel.BorderType = 'none';

app.rectificationPanel.Title = 'rectification';

app.rectificationPanel.BackgroundColor = [1 1 1];

app.rectificationPanel.FontWeight = 'bold';

app.rectificationPanel.Position = [1 166 534 101];

app.Slider\_2 = uislider(app.rectificationPanel);

app.Slider\_2.Limits = [0 1];

app.Slider\_2.MajorTicks = [0 0.5 1];

app.Slider\_2.ValueChangedFcn = createCallbackFcn(app, @Slider\_2ValueChanged, true);

app.Slider\_2.MinorTicks = [0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1];

app.Slider\_2.Position = [221 49 251 3];

app.Slider\_2.Value = 0.5;

app.alphaLabel = uilabel(app.rectificationPanel);

app.alphaLabel.HorizontalAlignment = 'right';

app.alphaLabel.Position = [50 30 34 22];

app.alphaLabel.Text = 'alpha';

app.alpha05EditField = uispinner(app.rectificationPanel);

app.alpha05EditField.Step = 0.1;

app.alpha05EditField.Limits = [0 1];

app.alpha05EditField.Position = [93 29 99 22];

app.alpha05EditField.Value = 0.5;

app.SimuButton = uibutton(app.tunnelingTab, 'push');

app.SimuButton.ButtonPushedFcn = createCallbackFcn(app, @SimuButtonPushed, true);

app.SimuButton.BackgroundColor = [0.651 0.651 0.651];

app.SimuButton.FontSize = 20;

app.SimuButton.FontWeight = 'bold';

app.SimuButton.FontColor = [1 1 0];

app.SimuButton.Position = [946 417 99 79];

app.SimuButton.Text = 'Simu';

app.Image2 = uiimage(app.tunnelingTab);

app.Image2.Position = [960 510 70 78];

app.Image2.ImageSource = 'xiaohui.jpg';

app.gatevoltagePanel = uipanel(app.tunnelingTab);

app.gatevoltagePanel.BorderType = 'none';

app.gatevoltagePanel.Title = 'gate voltage';

app.gatevoltagePanel.BackgroundColor = [1 1 1];

app.gatevoltagePanel.FontWeight = 'bold';

app.gatevoltagePanel.Position = [1 11 534 135];

app.Slider\_7 = uislider(app.gatevoltagePanel);

app.Slider\_7.Limits = [-1 1];

app.Slider\_7.MajorTicks = [-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1];

app.Slider\_7.ValueChangedFcn = createCallbackFcn(app, @Slider\_7ValueChanged, true);

app.Slider\_7.Position = [227 81 251 3];

app.gatevoltageLabel = uilabel(app.gatevoltagePanel);

app.gatevoltageLabel.HorizontalAlignment = 'right';

app.gatevoltageLabel.Position = [17 86 74 22];

app.gatevoltageLabel.Text = 'gate voltage';

app.voltageEditField\_8 = uispinner(app.gatevoltagePanel);

app.voltageEditField\_8.Step = 0.01;

app.voltageEditField\_8.Limits = [-5 5];

app.voltageEditField\_8.Position = [93 85 109 22];

app.gatingefficiencyEditFieldLabel = uilabel(app.gatevoltagePanel);

app.gatingefficiencyEditFieldLabel.HorizontalAlignment = 'right';

app.gatingefficiencyEditFieldLabel.Position = [7 51 94 22];

app.gatingefficiencyEditFieldLabel.Text = 'gating efficiency';

app.gatingefficiencyEditField = uieditfield(app.gatevoltagePanel, 'numeric');

app.gatingefficiencyEditField.Limits = [0 100];

app.gatingefficiencyEditField.Position = [102 51 100 22];

app.gatingefficiencyEditField.Value = 100;

app.Image8 = uiimage(app.gatevoltagePanel);

app.Image8.ImageClickedFcn = createCallbackFcn(app, @Image8Clicked, true);

app.Image8.Position = [25 9 34 34];

app.Image8.ImageSource = 'wenhap.jpg';

app.hoppingTab = uitab(app.TabGroup);

app.hoppingTab.Title = 'hopping';

app.hoppingTab.BackgroundColor = [1 1 1];

app.hoppingparametersPanel\_2 = uipanel(app.hoppingTab);

app.hoppingparametersPanel\_2.BorderType = 'none';

app.hoppingparametersPanel\_2.Title = 'hopping parameters';

app.hoppingparametersPanel\_2.BackgroundColor = [1 1 1];

app.hoppingparametersPanel\_2.FontWeight = 'bold';

app.hoppingparametersPanel\_2.Position = [1 379 534 218];

app.grEditField\_2Label = uilabel(app.hoppingparametersPanel\_2);

app.grEditField\_2Label.HorizontalAlignment = 'right';

app.grEditField\_2Label.Position = [114 133 25 22];

app.grEditField\_2Label.Text = 'gr';

app.grEditField\_2 = uieditfield(app.hoppingparametersPanel\_2, 'numeric');

app.grEditField\_2.Position = [144 133 55 22];

app.grEditField\_2.Value = 1;

app.glEditField\_2Label = uilabel(app.hoppingparametersPanel\_2);

app.glEditField\_2Label.HorizontalAlignment = 'right';

app.glEditField\_2Label.Position = [254 132 25 22];

app.glEditField\_2Label.Text = 'gl';

app.glEditField\_2 = uieditfield(app.hoppingparametersPanel\_2, 'numeric');

app.glEditField\_2.Position = [285 132 49 22];

app.glEditField\_2.Value = 1;

app.Knob\_4 = uiknob(app.hoppingparametersPanel\_2, 'continuous');

app.Knob\_4.Limits = [0 1];

app.Knob\_4.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_4.ValueChangedFcn = createCallbackFcn(app, @Knob\_4ValueChanged, true);

app.Knob\_4.Position = [29 52 54 54];

app.Knob\_4.Value = 0.5;

app.Knob\_5 = uiknob(app.hoppingparametersPanel\_2, 'continuous');

app.Knob\_5.Limits = [-3 3];

app.Knob\_5.ValueChangedFcn = createCallbackFcn(app, @Knob\_5ValueChanged, true);

app.Knob\_5.Position = [153 50 56 56];

app.Knob\_5.Value = 1;

app.Knob\_7 = uiknob(app.hoppingparametersPanel\_2, 'continuous');

app.Knob\_7.Limits = [0 1];

app.Knob\_7.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_7.ValueChangedFcn = createCallbackFcn(app, @Knob\_7ValueChanged, true);

app.Knob\_7.Position = [407 51 54 54];

app.Knob\_7.Value = 0.5;

app.grEditField\_2Label\_2 = uilabel(app.hoppingparametersPanel\_2);

app.grEditField\_2Label\_2.HorizontalAlignment = 'right';

app.grEditField\_2Label\_2.Position = [198 133 42 22];

app.grEditField\_2Label\_2.Text = '\*10^13';

app.grEditField\_2Label\_3 = uilabel(app.hoppingparametersPanel\_2);

app.grEditField\_2Label\_3.HorizontalAlignment = 'right';

app.grEditField\_2Label\_3.Position = [333 132 42 22];

app.grEditField\_2Label\_3.Text = '\*10^13';

app.Knob\_8 = uiknob(app.hoppingparametersPanel\_2, 'continuous');

app.Knob\_8.Limits = [-3 3];

app.Knob\_8.ValueChangedFcn = createCallbackFcn(app, @Knob\_8ValueChanged, true);

app.Knob\_8.Position = [278 50 56 56];

app.Knob\_8.Value = 1;

app.grEditField\_2Label\_4 = uilabel(app.hoppingparametersPanel\_2);

app.grEditField\_2Label\_4.HorizontalAlignment = 'right';

app.grEditField\_2Label\_4.FontWeight = 'bold';

app.grEditField\_2Label\_4.FontColor = [1 0 0];

app.grEditField\_2Label\_4.Position = [160 67 33 22];

app.grEditField\_2Label\_4.Text = 'LOG';

app.grEditField\_2Label\_5 = uilabel(app.hoppingparametersPanel\_2);

app.grEditField\_2Label\_5.HorizontalAlignment = 'right';

app.grEditField\_2Label\_5.FontWeight = 'bold';

app.grEditField\_2Label\_5.FontColor = [1 0 0];

app.grEditField\_2Label\_5.Position = [290 68 33 22];

app.grEditField\_2Label\_5.Text = 'LOG';

app.egLabel\_2 = uilabel(app.hoppingparametersPanel\_2);

app.egLabel\_2.HorizontalAlignment = 'right';

app.egLabel\_2.Position = [6 133 25 22];

app.egLabel\_2.Text = 'eg';

app.egEditField\_2 = uispinner(app.hoppingparametersPanel\_2);

app.egEditField\_2.Step = 0.001;

app.egEditField\_2.Limits = [0 5];

app.egEditField\_2.Position = [40 132 66 22];

app.egEditField\_2.Value = 0.5;

app.lambdaLabel = uilabel(app.hoppingparametersPanel\_2);

app.lambdaLabel.HorizontalAlignment = 'right';

app.lambdaLabel.Position = [382 133 45 22];

app.lambdaLabel.Text = 'lambda';

app.lambdaEditField = uispinner(app.hoppingparametersPanel\_2);

app.lambdaEditField.Step = 0.001;

app.lambdaEditField.Limits = [0 5];

app.lambdaEditField.Position = [436 132 66 22];

app.lambdaEditField.Value = 0.5;

app.voltagescalePanel\_5 = uipanel(app.hoppingTab);

app.voltagescalePanel\_5.BorderType = 'none';

app.voltagescalePanel\_5.Title = 'voltage scale';

app.voltagescalePanel\_5.BackgroundColor = [1 1 1];

app.voltagescalePanel\_5.FontWeight = 'bold';

app.voltagescalePanel\_5.Position = [1 242 534 138];

app.stepEditField\_5Label = uilabel(app.voltagescalePanel\_5);

app.stepEditField\_5Label.HorizontalAlignment = 'right';

app.stepEditField\_5Label.Position = [28 21 28 22];

app.stepEditField\_5Label.Text = 'step';

app.stepEditField\_5 = uieditfield(app.voltagescalePanel\_5, 'numeric');

app.stepEditField\_5.Position = [71 21 100 22];

app.stepEditField\_5.Value = 100;

app.Slider\_3 = uislider(app.voltagescalePanel\_5);

app.Slider\_3.Limits = [0 5];

app.Slider\_3.ValueChangedFcn = createCallbackFcn(app, @Slider\_3ValueChanged, true);

app.Slider\_3.Position = [221 77 251 3];

app.Slider\_3.Value = 1.5;

app.voltageLabel\_2 = uilabel(app.voltagescalePanel\_5);

app.voltageLabel\_2.HorizontalAlignment = 'right';

app.voltageLabel\_2.Position = [25 60 44 22];

app.voltageLabel\_2.Text = 'voltage';

app.voltageEditField\_5 = uispinner(app.voltagescalePanel\_5);

app.voltageEditField\_5.Step = 0.1;

app.voltageEditField\_5.Limits = [0 5];

app.voltageEditField\_5.Position = [71 59 109 22];

app.voltageEditField\_5.Value = 1.5;

app.resultPanel\_5 = uipanel(app.hoppingTab);

app.resultPanel\_5.BorderType = 'none';

app.resultPanel\_5.Title = 'result';

app.resultPanel\_5.BackgroundColor = [1 1 1];

app.resultPanel\_5.FontWeight = 'bold';

app.resultPanel\_5.Position = [543 1 400 596];

app.UIAxes\_5 = uiaxes(app.resultPanel\_5);

title(app.UIAxes\_5, '')

xlabel(app.UIAxes\_5, 'Voltage/V')

ylabel(app.UIAxes\_5, 'I/A')

app.UIAxes\_5.PlotBoxAspectRatio = [1.8855421686747 1 1];

app.UIAxes\_5.TitleFontWeight = 'bold';

app.UIAxes\_5.BackgroundColor = [1 1 1];

app.UIAxes\_5.Position = [1 300 391 276];

app.UIAxeslog\_5 = uiaxes(app.resultPanel\_5);

title(app.UIAxeslog\_5, '')

xlabel(app.UIAxeslog\_5, 'Voltage/V')

ylabel(app.UIAxeslog\_5, 'Log(I)')

app.UIAxeslog\_5.PlotBoxAspectRatio = [1.86309523809524 1 1];

app.UIAxeslog\_5.TitleFontWeight = 'bold';

app.UIAxeslog\_5.BackgroundColor = [1 1 1];

app.UIAxeslog\_5.Position = [1 22 391 279];

app.rectificationPanel\_3 = uipanel(app.hoppingTab);

app.rectificationPanel\_3.BorderType = 'none';

app.rectificationPanel\_3.Title = 'rectification';

app.rectificationPanel\_3.BackgroundColor = [1 1 1];

app.rectificationPanel\_3.FontWeight = 'bold';

app.rectificationPanel\_3.Position = [1 142 534 101];

app.Slider\_4 = uislider(app.rectificationPanel\_3);

app.Slider\_4.Limits = [0 1];

app.Slider\_4.MajorTicks = [0 0.5 1];

app.Slider\_4.ValueChangedFcn = createCallbackFcn(app, @Slider\_4ValueChanged, true);

app.Slider\_4.MinorTicks = [0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9];

app.Slider\_4.Position = [221 49 251 3];

app.Slider\_4.Value = 0.5;

app.alphaLabel\_2 = uilabel(app.rectificationPanel\_3);

app.alphaLabel\_2.HorizontalAlignment = 'right';

app.alphaLabel\_2.Position = [30 39 34 22];

app.alphaLabel\_2.Text = 'alpha';

app.alpha05EditField\_3 = uispinner(app.rectificationPanel\_3);

app.alpha05EditField\_3.Step = 0.1;

app.alpha05EditField\_3.Limits = [0 1];

app.alpha05EditField\_3.Position = [73 38 99 22];

app.alpha05EditField\_3.Value = 0.5;

app.SimuButton\_2 = uibutton(app.hoppingTab, 'push');

app.SimuButton\_2.ButtonPushedFcn = createCallbackFcn(app, @SimuButton\_2Pushed, true);

app.SimuButton\_2.BackgroundColor = [0.651 0.651 0.651];

app.SimuButton\_2.FontSize = 20;

app.SimuButton\_2.FontWeight = 'bold';

app.SimuButton\_2.FontColor = [1 1 0];

app.SimuButton\_2.Position = [946 417 99 79];

app.SimuButton\_2.Text = 'Simu';

app.Image2\_5 = uiimage(app.hoppingTab);

app.Image2\_5.Position = [960 510 70 78];

app.Image2\_5.ImageSource = 'xiaohui.jpg';

app.gatevoltagePanel\_2 = uipanel(app.hoppingTab);

app.gatevoltagePanel\_2.BorderType = 'none';

app.gatevoltagePanel\_2.Title = 'gate voltage';

app.gatevoltagePanel\_2.BackgroundColor = [1 1 1];

app.gatevoltagePanel\_2.FontWeight = 'bold';

app.gatevoltagePanel\_2.Position = [1 11 534 135];

app.Slider\_8 = uislider(app.gatevoltagePanel\_2);

app.Slider\_8.Limits = [-1 1];

app.Slider\_8.MajorTicks = [-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1];

app.Slider\_8.ValueChangedFcn = createCallbackFcn(app, @Slider\_8ValueChanged, true);

app.Slider\_8.Position = [227 81 251 3];

app.gatevoltageLabel\_2 = uilabel(app.gatevoltagePanel\_2);

app.gatevoltageLabel\_2.HorizontalAlignment = 'right';

app.gatevoltageLabel\_2.Position = [17 86 74 22];

app.gatevoltageLabel\_2.Text = 'gate voltage';

app.voltageEditField\_9 = uispinner(app.gatevoltagePanel\_2);

app.voltageEditField\_9.Step = 0.01;

app.voltageEditField\_9.Limits = [-5 5];

app.voltageEditField\_9.Position = [93 85 109 22];

app.gatingefficiencyEditField\_2Label = uilabel(app.gatevoltagePanel\_2);

app.gatingefficiencyEditField\_2Label.HorizontalAlignment = 'right';

app.gatingefficiencyEditField\_2Label.Position = [7 51 94 22];

app.gatingefficiencyEditField\_2Label.Text = 'gating efficiency';

app.gatingefficiencyEditField\_2 = uieditfield(app.gatevoltagePanel\_2, 'numeric');

app.gatingefficiencyEditField\_2.Limits = [0 100];

app.gatingefficiencyEditField\_2.Position = [102 51 100 22];

app.gatingefficiencyEditField\_2.Value = 100;

app.Image8\_2 = uiimage(app.gatevoltagePanel\_2);

app.Image8\_2.ImageClickedFcn = createCallbackFcn(app, @Image8\_2Clicked, true);

app.Image8\_2.Position = [17 11 34 34];

app.Image8\_2.ImageSource = 'wenhap.jpg';

app.mixedtransportTab = uitab(app.TabGroup);

app.mixedtransportTab.Title = 'mixed transport';

app.mixedtransportTab.BackgroundColor = [1 1 1];

app.hoppingchannelPanel = uipanel(app.mixedtransportTab);

app.hoppingchannelPanel.BorderType = 'none';

app.hoppingchannelPanel.Title = 'hopping channel';

app.hoppingchannelPanel.BackgroundColor = [1 1 1];

app.hoppingchannelPanel.FontWeight = 'bold';

app.hoppingchannelPanel.Position = [1 397 534 200];

app.grEditField\_6Label = uilabel(app.hoppingchannelPanel);

app.grEditField\_6Label.HorizontalAlignment = 'right';

app.grEditField\_6Label.Position = [114 115 25 22];

app.grEditField\_6Label.Text = 'gr';

app.grEditField\_6 = uieditfield(app.hoppingchannelPanel, 'numeric');

app.grEditField\_6.Position = [144 115 55 22];

app.grEditField\_6.Value = 1;

app.glEditField\_3Label = uilabel(app.hoppingchannelPanel);

app.glEditField\_3Label.HorizontalAlignment = 'right';

app.glEditField\_3Label.Position = [254 114 25 22];

app.glEditField\_3Label.Text = 'gl';

app.glEditField\_3 = uieditfield(app.hoppingchannelPanel, 'numeric');

app.glEditField\_3.Position = [285 114 49 22];

app.glEditField\_3.Value = 1;

app.Knob\_9 = uiknob(app.hoppingchannelPanel, 'continuous');

app.Knob\_9.Limits = [0 1];

app.Knob\_9.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_9.ValueChangedFcn = createCallbackFcn(app, @Knob\_9ValueChanged, true);

app.Knob\_9.Position = [29 34 54 54];

app.Knob\_9.Value = 0.5;

app.Knob\_10 = uiknob(app.hoppingchannelPanel, 'continuous');

app.Knob\_10.Limits = [-3 3];

app.Knob\_10.ValueChangedFcn = createCallbackFcn(app, @Knob\_10ValueChanged, true);

app.Knob\_10.Position = [153 32 56 56];

app.Knob\_10.Value = 1;

app.Knob\_11 = uiknob(app.hoppingchannelPanel, 'continuous');

app.Knob\_11.Limits = [0 1];

app.Knob\_11.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_11.ValueChangedFcn = createCallbackFcn(app, @Knob\_11ValueChanged, true);

app.Knob\_11.Position = [407 33 54 54];

app.Knob\_11.Value = 0.5;

app.grEditField\_2Label\_6 = uilabel(app.hoppingchannelPanel);

app.grEditField\_2Label\_6.HorizontalAlignment = 'right';

app.grEditField\_2Label\_6.Position = [198 115 42 22];

app.grEditField\_2Label\_6.Text = '\*10^13';

app.grEditField\_2Label\_7 = uilabel(app.hoppingchannelPanel);

app.grEditField\_2Label\_7.HorizontalAlignment = 'right';

app.grEditField\_2Label\_7.Position = [333 114 42 22];

app.grEditField\_2Label\_7.Text = '\*10^13';

app.Knob\_12 = uiknob(app.hoppingchannelPanel, 'continuous');

app.Knob\_12.Limits = [-3 3];

app.Knob\_12.ValueChangedFcn = createCallbackFcn(app, @Knob\_12ValueChanged, true);

app.Knob\_12.Position = [278 32 56 56];

app.Knob\_12.Value = 1;

app.grEditField\_2Label\_8 = uilabel(app.hoppingchannelPanel);

app.grEditField\_2Label\_8.HorizontalAlignment = 'right';

app.grEditField\_2Label\_8.FontWeight = 'bold';

app.grEditField\_2Label\_8.FontColor = [1 0 0];

app.grEditField\_2Label\_8.Position = [160 49 33 22];

app.grEditField\_2Label\_8.Text = 'LOG';

app.grEditField\_2Label\_9 = uilabel(app.hoppingchannelPanel);

app.grEditField\_2Label\_9.HorizontalAlignment = 'right';

app.grEditField\_2Label\_9.FontWeight = 'bold';

app.grEditField\_2Label\_9.FontColor = [1 0 0];

app.grEditField\_2Label\_9.Position = [290 50 33 22];

app.grEditField\_2Label\_9.Text = 'LOG';

app.egLabel\_3 = uilabel(app.hoppingchannelPanel);

app.egLabel\_3.HorizontalAlignment = 'right';

app.egLabel\_3.Position = [9 116 25 22];

app.egLabel\_3.Text = 'eg';

app.egEditField\_3 = uispinner(app.hoppingchannelPanel);

app.egEditField\_3.Step = 0.001;

app.egEditField\_3.Limits = [0 5];

app.egEditField\_3.Position = [43 115 66 22];

app.egEditField\_3.Value = 0.5;

app.lambdaLabel\_2 = uilabel(app.hoppingchannelPanel);

app.lambdaLabel\_2.HorizontalAlignment = 'right';

app.lambdaLabel\_2.Position = [382 115 45 22];

app.lambdaLabel\_2.Text = 'lambda';

app.lambdaEditField\_2 = uispinner(app.hoppingchannelPanel);

app.lambdaEditField\_2.Step = 0.001;

app.lambdaEditField\_2.Limits = [0 5];

app.lambdaEditField\_2.Position = [436 114 66 22];

app.lambdaEditField\_2.Value = 0.5;

app.voltagescalePanel\_6 = uipanel(app.mixedtransportTab);

app.voltagescalePanel\_6.BorderType = 'none';

app.voltagescalePanel\_6.Title = 'voltage scale';

app.voltagescalePanel\_6.BackgroundColor = [1 1 1];

app.voltagescalePanel\_6.FontWeight = 'bold';

app.voltagescalePanel\_6.Position = [2 89 533 138];

app.stepEditField\_6Label = uilabel(app.voltagescalePanel\_6);

app.stepEditField\_6Label.HorizontalAlignment = 'right';

app.stepEditField\_6Label.Position = [28 21 28 22];

app.stepEditField\_6Label.Text = 'step';

app.stepEditField\_6 = uieditfield(app.voltagescalePanel\_6, 'numeric');

app.stepEditField\_6.Position = [71 21 100 22];

app.stepEditField\_6.Value = 100;

app.Slider\_5 = uislider(app.voltagescalePanel\_6);

app.Slider\_5.Limits = [0 5];

app.Slider\_5.ValueChangedFcn = createCallbackFcn(app, @Slider\_5ValueChanged, true);

app.Slider\_5.Position = [221 77 251 3];

app.Slider\_5.Value = 1.5;

app.voltageLabel\_3 = uilabel(app.voltagescalePanel\_6);

app.voltageLabel\_3.HorizontalAlignment = 'right';

app.voltageLabel\_3.Position = [24 68 44 22];

app.voltageLabel\_3.Text = 'voltage';

app.voltageEditField\_6 = uispinner(app.voltagescalePanel\_6);

app.voltageEditField\_6.Step = 0.1;

app.voltageEditField\_6.Limits = [0 5];

app.voltageEditField\_6.Position = [70 67 109 22];

app.voltageEditField\_6.Value = 1.5;

app.resultPanel\_6 = uipanel(app.mixedtransportTab);

app.resultPanel\_6.BorderType = 'none';

app.resultPanel\_6.Title = 'result';

app.resultPanel\_6.BackgroundColor = [1 1 1];

app.resultPanel\_6.FontWeight = 'bold';

app.resultPanel\_6.Position = [543 1 404 596];

app.UIAxes\_6 = uiaxes(app.resultPanel\_6);

title(app.UIAxes\_6, '')

xlabel(app.UIAxes\_6, 'Voltage/V')

ylabel(app.UIAxes\_6, 'I/A')

app.UIAxes\_6.PlotBoxAspectRatio = [1.8855421686747 1 1];

app.UIAxes\_6.TitleFontWeight = 'bold';

app.UIAxes\_6.BackgroundColor = [1 1 1];

app.UIAxes\_6.Position = [1 297 391 286];

app.UIAxeslog\_6 = uiaxes(app.resultPanel\_6);

title(app.UIAxeslog\_6, '')

xlabel(app.UIAxeslog\_6, 'Voltage/V')

ylabel(app.UIAxeslog\_6, 'Log(I)')

app.UIAxeslog\_6.PlotBoxAspectRatio = [1.86309523809524 1 1];

app.UIAxeslog\_6.TitleFontWeight = 'bold';

app.UIAxeslog\_6.BackgroundColor = [1 1 1];

app.UIAxeslog\_6.Position = [1 27 391 271];

app.SimuButton\_3 = uibutton(app.mixedtransportTab, 'push');

app.SimuButton\_3.ButtonPushedFcn = createCallbackFcn(app, @SimuButton\_3Pushed, true);

app.SimuButton\_3.BackgroundColor = [0.651 0.651 0.651];

app.SimuButton\_3.FontSize = 20;

app.SimuButton\_3.FontWeight = 'bold';

app.SimuButton\_3.FontColor = [1 1 0];

app.SimuButton\_3.Position = [946 417 99 79];

app.SimuButton\_3.Text = 'Simu';

app.Image2\_6 = uiimage(app.mixedtransportTab);

app.Image2\_6.Position = [960 510 70 78];

app.Image2\_6.ImageSource = 'xiaohui.jpg';

app.tunnelingchannelPanel = uipanel(app.mixedtransportTab);

app.tunnelingchannelPanel.BorderType = 'none';

app.tunnelingchannelPanel.Title = 'tunneling channel';

app.tunnelingchannelPanel.BackgroundColor = [1 1 1];

app.tunnelingchannelPanel.FontWeight = 'bold';

app.tunnelingchannelPanel.Position = [3 226 532 159];

app.Knob\_13 = uiknob(app.tunnelingchannelPanel, 'continuous');

app.Knob\_13.Limits = [0 1];

app.Knob\_13.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_13.ValueChangedFcn = createCallbackFcn(app, @Knob\_13ValueChanged, true);

app.Knob\_13.Position = [35 27 46 46];

app.Knob\_13.Value = 0.5;

app.Knob\_14 = uiknob(app.tunnelingchannelPanel, 'continuous');

app.Knob\_14.Limits = [0 0.1];

app.Knob\_14.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_14.ValueChangedFcn = createCallbackFcn(app, @Knob\_14ValueChanged, true);

app.Knob\_14.Position = [207 27 46 46];

app.Knob\_14.Value = 0.005;

app.Knob\_15 = uiknob(app.tunnelingchannelPanel, 'continuous');

app.Knob\_15.Limits = [0 0.1];

app.Knob\_15.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_15.ValueChangedFcn = createCallbackFcn(app, @Knob\_15ValueChanged, true);

app.Knob\_15.Position = [386 27 46 46];

app.Knob\_15.Value = 0.005;

app.egLabel\_4 = uilabel(app.tunnelingchannelPanel);

app.egLabel\_4.HorizontalAlignment = 'right';

app.egLabel\_4.Position = [8 102 25 22];

app.egLabel\_4.Text = 'eg';

app.egEditField\_4 = uispinner(app.tunnelingchannelPanel);

app.egEditField\_4.Step = 0.001;

app.egEditField\_4.Limits = [0 5];

app.egEditField\_4.Position = [42 101 66 22];

app.egEditField\_4.Value = 0.5;

app.grLabel\_2 = uilabel(app.tunnelingchannelPanel);

app.grLabel\_2.HorizontalAlignment = 'right';

app.grLabel\_2.Position = [180 102 25 22];

app.grLabel\_2.Text = 'gr';

app.grEditField\_10 = uispinner(app.tunnelingchannelPanel);

app.grEditField\_10.Step = 0.001;

app.grEditField\_10.Limits = [0.001 5];

app.grEditField\_10.Position = [214 101 66 22];

app.grEditField\_10.Value = 0.005;

app.glLabel\_2 = uilabel(app.tunnelingchannelPanel);

app.glLabel\_2.HorizontalAlignment = 'right';

app.glLabel\_2.Position = [359 101 25 22];

app.glLabel\_2.Text = 'gl';

app.glEditField\_4 = uispinner(app.tunnelingchannelPanel);

app.glEditField\_4.Step = 0.001;

app.glEditField\_4.Limits = [0.001 5];

app.glEditField\_4.Position = [393 100 66 22];

app.glEditField\_4.Value = 0.005;

app.nonsteadystateTab = uitab(app.TabGroup);

app.nonsteadystateTab.Title = 'nonsteady state';

app.nonsteadystateTab.BackgroundColor = [1 1 1];

app.resultPanel\_7 = uipanel(app.nonsteadystateTab);

app.resultPanel\_7.BorderType = 'none';

app.resultPanel\_7.Title = 'result';

app.resultPanel\_7.BackgroundColor = [1 1 1];

app.resultPanel\_7.FontWeight = 'bold';

app.resultPanel\_7.Position = [543 1 410 596];

app.UIAxes\_7 = uiaxes(app.resultPanel\_7);

title(app.UIAxes\_7, '')

xlabel(app.UIAxes\_7, 'Voltage/V')

ylabel(app.UIAxes\_7, 'I/A')

app.UIAxes\_7.PlotBoxAspectRatio = [1.8855421686747 1 1];

app.UIAxes\_7.TitleFontWeight = 'bold';

app.UIAxes\_7.BackgroundColor = [1 1 1];

app.UIAxes\_7.Position = [1 297 391 286];

app.UIAxeslog\_7 = uiaxes(app.resultPanel\_7);

title(app.UIAxeslog\_7, '')

xlabel(app.UIAxeslog\_7, 'Voltage/V')

ylabel(app.UIAxeslog\_7, 'Log(I)')

app.UIAxeslog\_7.PlotBoxAspectRatio = [1.86309523809524 1 1];

app.UIAxeslog\_7.TitleFontWeight = 'bold';

app.UIAxeslog\_7.BackgroundColor = [1 1 1];

app.UIAxeslog\_7.Position = [1 27 391 271];

app.SimuButton\_4 = uibutton(app.nonsteadystateTab, 'push');

app.SimuButton\_4.ButtonPushedFcn = createCallbackFcn(app, @SimuButton\_4Pushed, true);

app.SimuButton\_4.BackgroundColor = [0.651 0.651 0.651];

app.SimuButton\_4.FontSize = 20;

app.SimuButton\_4.FontWeight = 'bold';

app.SimuButton\_4.FontColor = [1 1 0];

app.SimuButton\_4.Position = [952 419 99 79];

app.SimuButton\_4.Text = 'Simu';

app.Image2\_7 = uiimage(app.nonsteadystateTab);

app.Image2\_7.Position = [960 510 70 78];

app.Image2\_7.ImageSource = 'xiaohui.jpg';

app.voltagescalePanel\_7 = uipanel(app.nonsteadystateTab);

app.voltagescalePanel\_7.BorderType = 'none';

app.voltagescalePanel\_7.Title = 'voltage scale';

app.voltagescalePanel\_7.BackgroundColor = [1 1 1];

app.voltagescalePanel\_7.FontWeight = 'bold';

app.voltagescalePanel\_7.Position = [0 0 544 138];

app.stepEditField\_7Label = uilabel(app.voltagescalePanel\_7);

app.stepEditField\_7Label.HorizontalAlignment = 'right';

app.stepEditField\_7Label.Position = [28 21 28 22];

app.stepEditField\_7Label.Text = 'step';

app.stepEditField\_7 = uieditfield(app.voltagescalePanel\_7, 'numeric');

app.stepEditField\_7.Position = [71 21 100 22];

app.stepEditField\_7.Value = 100;

app.Slider\_6 = uislider(app.voltagescalePanel\_7);

app.Slider\_6.Limits = [0 5];

app.Slider\_6.ValueChangedFcn = createCallbackFcn(app, @Slider\_6ValueChanged, true);

app.Slider\_6.Position = [221 77 251 3];

app.Slider\_6.Value = 1.5;

app.voltageLabel\_4 = uilabel(app.voltagescalePanel\_7);

app.voltageLabel\_4.HorizontalAlignment = 'right';

app.voltageLabel\_4.Position = [24 68 44 22];

app.voltageLabel\_4.Text = 'voltage';

app.voltageEditField\_7 = uispinner(app.voltagescalePanel\_7);

app.voltageEditField\_7.Step = 0.1;

app.voltageEditField\_7.Limits = [0 5];

app.voltageEditField\_7.Position = [70 67 109 22];

app.voltageEditField\_7.Value = 1.5;

app.channel1Panel = uipanel(app.nonsteadystateTab);

app.channel1Panel.BorderType = 'none';

app.channel1Panel.Title = 'channel1';

app.channel1Panel.BackgroundColor = [1 1 1];

app.channel1Panel.FontWeight = 'bold';

app.channel1Panel.Position = [1 444 543 153];

app.grEditField\_11Label = uilabel(app.channel1Panel);

app.grEditField\_11Label.HorizontalAlignment = 'right';

app.grEditField\_11Label.Position = [114 108 25 22];

app.grEditField\_11Label.Text = 'gr';

app.grEditField\_11 = uieditfield(app.channel1Panel, 'numeric');

app.grEditField\_11.Position = [144 108 55 22];

app.grEditField\_11.Value = 1;

app.glEditField\_5Label = uilabel(app.channel1Panel);

app.glEditField\_5Label.HorizontalAlignment = 'right';

app.glEditField\_5Label.Position = [254 107 25 22];

app.glEditField\_5Label.Text = 'gl';

app.glEditField\_5 = uieditfield(app.channel1Panel, 'numeric');

app.glEditField\_5.Position = [285 107 49 22];

app.glEditField\_5.Value = 1;

app.Knob\_16 = uiknob(app.channel1Panel, 'continuous');

app.Knob\_16.Limits = [0 1];

app.Knob\_16.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_16.ValueChangedFcn = createCallbackFcn(app, @Knob\_16ValueChanged, true);

app.Knob\_16.Position = [29 27 54 54];

app.Knob\_16.Value = 0.3;

app.Knob\_17 = uiknob(app.channel1Panel, 'continuous');

app.Knob\_17.Limits = [-3 3];

app.Knob\_17.ValueChangedFcn = createCallbackFcn(app, @Knob\_17ValueChanged, true);

app.Knob\_17.Position = [153 25 56 56];

app.Knob\_17.Value = 1;

app.Knob\_18 = uiknob(app.channel1Panel, 'continuous');

app.Knob\_18.Limits = [0 1];

app.Knob\_18.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_18.ValueChangedFcn = createCallbackFcn(app, @Knob\_18ValueChanged, true);

app.Knob\_18.Position = [407 26 54 54];

app.Knob\_18.Value = 0.8;

app.grEditField\_2Label\_10 = uilabel(app.channel1Panel);

app.grEditField\_2Label\_10.HorizontalAlignment = 'right';

app.grEditField\_2Label\_10.Position = [198 108 42 22];

app.grEditField\_2Label\_10.Text = '\*10^13';

app.grEditField\_2Label\_11 = uilabel(app.channel1Panel);

app.grEditField\_2Label\_11.HorizontalAlignment = 'right';

app.grEditField\_2Label\_11.Position = [333 107 42 22];

app.grEditField\_2Label\_11.Text = '\*10^13';

app.Knob\_19 = uiknob(app.channel1Panel, 'continuous');

app.Knob\_19.Limits = [-3 3];

app.Knob\_19.ValueChangedFcn = createCallbackFcn(app, @Knob\_19ValueChanged, true);

app.Knob\_19.Position = [278 25 56 56];

app.Knob\_19.Value = 1;

app.grEditField\_2Label\_12 = uilabel(app.channel1Panel);

app.grEditField\_2Label\_12.HorizontalAlignment = 'right';

app.grEditField\_2Label\_12.FontWeight = 'bold';

app.grEditField\_2Label\_12.FontColor = [1 0 0];

app.grEditField\_2Label\_12.Position = [160 42 33 22];

app.grEditField\_2Label\_12.Text = 'LOG';

app.grEditField\_2Label\_13 = uilabel(app.channel1Panel);

app.grEditField\_2Label\_13.HorizontalAlignment = 'right';

app.grEditField\_2Label\_13.FontWeight = 'bold';

app.grEditField\_2Label\_13.FontColor = [1 0 0];

app.grEditField\_2Label\_13.Position = [290 43 33 22];

app.grEditField\_2Label\_13.Text = 'LOG';

app.egLabel\_5 = uilabel(app.channel1Panel);

app.egLabel\_5.HorizontalAlignment = 'right';

app.egLabel\_5.Position = [9 108 25 22];

app.egLabel\_5.Text = 'eg';

app.egEditField\_5 = uispinner(app.channel1Panel);

app.egEditField\_5.Step = 0.001;

app.egEditField\_5.Limits = [0 5];

app.egEditField\_5.Position = [43 108 66 22];

app.egEditField\_5.Value = 0.3;

app.lambdaLabel\_3 = uilabel(app.channel1Panel);

app.lambdaLabel\_3.HorizontalAlignment = 'right';

app.lambdaLabel\_3.Position = [382 108 45 22];

app.lambdaLabel\_3.Text = 'lambda';

app.lambdaEditField\_3 = uispinner(app.channel1Panel);

app.lambdaEditField\_3.Step = 0.001;

app.lambdaEditField\_3.Limits = [0 5];

app.lambdaEditField\_3.Position = [436 107 66 22];

app.lambdaEditField\_3.Value = 0.8;

app.channel2Panel = uipanel(app.nonsteadystateTab);

app.channel2Panel.BorderType = 'none';

app.channel2Panel.Title = 'channel2';

app.channel2Panel.BackgroundColor = [1 1 1];

app.channel2Panel.FontWeight = 'bold';

app.channel2Panel.Position = [1 292 543 153];

app.grEditField\_14Label = uilabel(app.channel2Panel);

app.grEditField\_14Label.HorizontalAlignment = 'right';

app.grEditField\_14Label.Position = [114 108 25 22];

app.grEditField\_14Label.Text = 'gr';

app.grEditField\_14 = uieditfield(app.channel2Panel, 'numeric');

app.grEditField\_14.Position = [144 108 55 22];

app.grEditField\_14.Value = 0.1;

app.glEditField\_6Label = uilabel(app.channel2Panel);

app.glEditField\_6Label.HorizontalAlignment = 'right';

app.glEditField\_6Label.Position = [254 107 25 22];

app.glEditField\_6Label.Text = 'gl';

app.glEditField\_6 = uieditfield(app.channel2Panel, 'numeric');

app.glEditField\_6.Position = [285 107 49 22];

app.glEditField\_6.Value = 0.01;

app.Knob\_20 = uiknob(app.channel2Panel, 'continuous');

app.Knob\_20.Limits = [0 1];

app.Knob\_20.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_20.ValueChangedFcn = createCallbackFcn(app, @Knob\_20ValueChanged, true);

app.Knob\_20.Position = [29 27 54 54];

app.Knob\_20.Value = 0.2;

app.Knob\_21 = uiknob(app.channel2Panel, 'continuous');

app.Knob\_21.Limits = [-3 3];

app.Knob\_21.ValueChangedFcn = createCallbackFcn(app, @Knob\_21ValueChanged, true);

app.Knob\_21.Position = [153 25 56 56];

app.Knob\_21.Value = -1;

app.Knob\_22 = uiknob(app.channel2Panel, 'continuous');

app.Knob\_22.Limits = [0 1];

app.Knob\_22.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_22.ValueChangedFcn = createCallbackFcn(app, @Knob\_22ValueChanged, true);

app.Knob\_22.Position = [407 26 54 54];

app.Knob\_22.Value = 0.9;

app.grEditField\_2Label\_14 = uilabel(app.channel2Panel);

app.grEditField\_2Label\_14.HorizontalAlignment = 'right';

app.grEditField\_2Label\_14.Position = [198 108 42 22];

app.grEditField\_2Label\_14.Text = '\*10^13';

app.grEditField\_2Label\_15 = uilabel(app.channel2Panel);

app.grEditField\_2Label\_15.HorizontalAlignment = 'right';

app.grEditField\_2Label\_15.Position = [333 107 42 22];

app.grEditField\_2Label\_15.Text = '\*10^13';

app.Knob\_23 = uiknob(app.channel2Panel, 'continuous');

app.Knob\_23.Limits = [-3 3];

app.Knob\_23.ValueChangedFcn = createCallbackFcn(app, @Knob\_23ValueChanged, true);

app.Knob\_23.Position = [278 25 56 56];

app.Knob\_23.Value = -2;

app.grEditField\_2Label\_16 = uilabel(app.channel2Panel);

app.grEditField\_2Label\_16.HorizontalAlignment = 'right';

app.grEditField\_2Label\_16.FontWeight = 'bold';

app.grEditField\_2Label\_16.FontColor = [1 0 0];

app.grEditField\_2Label\_16.Position = [160 42 33 22];

app.grEditField\_2Label\_16.Text = 'LOG';

app.grEditField\_2Label\_17 = uilabel(app.channel2Panel);

app.grEditField\_2Label\_17.HorizontalAlignment = 'right';

app.grEditField\_2Label\_17.FontWeight = 'bold';

app.grEditField\_2Label\_17.FontColor = [1 0 0];

app.grEditField\_2Label\_17.Position = [290 43 33 22];

app.grEditField\_2Label\_17.Text = 'LOG';

app.egLabel\_6 = uilabel(app.channel2Panel);

app.egLabel\_6.HorizontalAlignment = 'right';

app.egLabel\_6.Position = [9 108 25 22];

app.egLabel\_6.Text = 'eg';

app.egEditField\_6 = uispinner(app.channel2Panel);

app.egEditField\_6.Step = 0.001;

app.egEditField\_6.Limits = [0 5];

app.egEditField\_6.Position = [43 108 66 22];

app.egEditField\_6.Value = 0.2;

app.lambdaLabel\_4 = uilabel(app.channel2Panel);

app.lambdaLabel\_4.HorizontalAlignment = 'right';

app.lambdaLabel\_4.Position = [382 108 45 22];

app.lambdaLabel\_4.Text = 'lambda';

app.lambdaEditField\_4 = uispinner(app.channel2Panel);

app.lambdaEditField\_4.Step = 0.001;

app.lambdaEditField\_4.Limits = [0 5];

app.lambdaEditField\_4.Position = [436 107 66 22];

app.lambdaEditField\_4.Value = 0.9;

app.kneticparametersPanel = uipanel(app.nonsteadystateTab);

app.kneticparametersPanel.BorderType = 'none';

app.kneticparametersPanel.Title = 'knetic parameters';

app.kneticparametersPanel.BackgroundColor = [1 1 1];

app.kneticparametersPanel.FontWeight = 'bold';

app.kneticparametersPanel.Position = [1 137 543 153];

app.Knob\_26 = uiknob(app.kneticparametersPanel, 'continuous');

app.Knob\_26.Limits = [0 10];

app.Knob\_26.MajorTicks = [0 1 2 3 4 5 6 7 8 9 10];

app.Knob\_26.ValueChangedFcn = createCallbackFcn(app, @Knob\_26ValueChanged, true);

app.Knob\_26.Position = [407 26 54 54];

app.Knob\_26.Value = 0.5;

app.knLabel = uilabel(app.kneticparametersPanel);

app.knLabel.HorizontalAlignment = 'right';

app.knLabel.Position = [9 108 25 22];

app.knLabel.Text = 'kn';

app.kn = uispinner(app.kneticparametersPanel);

app.kn.Step = 0.001;

app.kn.Limits = [0 Inf];

app.kn.Position = [43 108 66 22];

app.kn.Value = 0.05;

app.scanrateLabel = uilabel(app.kneticparametersPanel);

app.scanrateLabel.HorizontalAlignment = 'right';

app.scanrateLabel.Position = [372 108 55 22];

app.scanrateLabel.Text = 'scan rate';

app.scanrate = uispinner(app.kneticparametersPanel);

app.scanrate.Step = 0.1;

app.scanrate.Limits = [0 Inf];

app.scanrate.Position = [436 107 66 22];

app.scanrate.Value = 0.5;

app.kpLabel = uilabel(app.kneticparametersPanel);

app.kpLabel.HorizontalAlignment = 'right';

app.kpLabel.Position = [127 108 25 22];

app.kpLabel.Text = 'kp';

app.kp = uispinner(app.kneticparametersPanel);

app.kp.Limits = [0 Inf];

app.kp.ValueChangedFcn = createCallbackFcn(app, @kpValueChanged, true);

app.kp.Position = [161 108 66 22];

app.kp.Value = 10;

app.protonLabel = uilabel(app.kneticparametersPanel);

app.protonLabel.HorizontalAlignment = 'right';

app.protonLabel.Position = [246 108 39 22];

app.protonLabel.Text = 'proton';

app.proton = uispinner(app.kneticparametersPanel);

app.proton.Limits = [0 100];

app.proton.Position = [294 108 66 22];

app.proton.Value = 20;

app.Knob\_27 = uiknob(app.kneticparametersPanel, 'continuous');

app.Knob\_27.Limits = [-4 2];

app.Knob\_27.MajorTicks = [-4 -3 -2 -1 0 1 2];

app.Knob\_27.MajorTickLabels = {'-4', '-3', '-2', '-1', '0', '1', '2'};

app.Knob\_27.ValueChangedFcn = createCallbackFcn(app, @Knob\_27ValueChanged, true);

app.Knob\_27.Position = [29 25 56 56];

app.Knob\_27.Value = -1.7;

app.grEditField\_2Label\_18 = uilabel(app.kneticparametersPanel);

app.grEditField\_2Label\_18.HorizontalAlignment = 'right';

app.grEditField\_2Label\_18.FontWeight = 'bold';

app.grEditField\_2Label\_18.FontColor = [1 0 0];

app.grEditField\_2Label\_18.Position = [37 42 33 22];

app.grEditField\_2Label\_18.Text = 'LOG';

app.Knob\_28 = uiknob(app.kneticparametersPanel, 'continuous');

app.Knob\_28.Limits = [-2 4];

app.Knob\_28.MajorTicks = [-2 -1 0 1 2 3 4];

app.Knob\_28.MajorTickLabels = {'-2', '-1', '0', '1', '2', '3', '4'};

app.Knob\_28.ValueChangedFcn = createCallbackFcn(app, @Knob\_28ValueChanged, true);

app.Knob\_28.Position = [153 24 56 56];

app.grEditField\_2Label\_19 = uilabel(app.kneticparametersPanel);

app.grEditField\_2Label\_19.HorizontalAlignment = 'right';

app.grEditField\_2Label\_19.FontWeight = 'bold';

app.grEditField\_2Label\_19.FontColor = [1 0 0];

app.grEditField\_2Label\_19.Position = [161 41 33 22];

app.grEditField\_2Label\_19.Text = 'LOG';

app.Knob\_29 = uiknob(app.kneticparametersPanel, 'continuous');

app.Knob\_29.MajorTicks = [0 10 20 30 40 50 60 70 80 90 100];

app.Knob\_29.ValueChangedFcn = createCallbackFcn(app, @Knob\_29ValueChanged, true);

app.Knob\_29.Position = [276 26 54 54];

app.Knob\_29.Value = 20;

app.thermoelectricTab = uitab(app.TabGroup);

app.thermoelectricTab.Title = 'thermoelectric';

app.tunnelingparametersPanel\_2 = uipanel(app.thermoelectricTab);

app.tunnelingparametersPanel\_2.BorderType = 'none';

app.tunnelingparametersPanel\_2.Title = 'tunneling parameters';

app.tunnelingparametersPanel\_2.BackgroundColor = [1 1 1];

app.tunnelingparametersPanel\_2.FontWeight = 'bold';

app.tunnelingparametersPanel\_2.Position = [1 379 534 218];

app.Knob\_30 = uiknob(app.tunnelingparametersPanel\_2, 'continuous');

app.Knob\_30.Limits = [0 1];

app.Knob\_30.MajorTicks = [0 0.2 0.4 0.6 0.8 1];

app.Knob\_30.ValueChangedFcn = createCallbackFcn(app, @Knob\_30ValueChanged, true);

app.Knob\_30.Position = [35 39 72 72];

app.Knob\_30.Value = 0.5;

app.Knob\_31 = uiknob(app.tunnelingparametersPanel\_2, 'continuous');

app.Knob\_31.Limits = [0 0.1];

app.Knob\_31.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_31.ValueChangedFcn = createCallbackFcn(app, @Knob\_31ValueChanged, true);

app.Knob\_31.Position = [207 39 72 72];

app.Knob\_31.Value = 0.005;

app.Knob\_32 = uiknob(app.tunnelingparametersPanel\_2, 'continuous');

app.Knob\_32.Limits = [0 0.1];

app.Knob\_32.MajorTicks = [0 0.02 0.04 0.06 0.08 0.1];

app.Knob\_32.ValueChangedFcn = createCallbackFcn(app, @Knob\_32ValueChanged, true);

app.Knob\_32.Position = [386 39 72 72];

app.Knob\_32.Value = 0.005;

app.egLabel\_7 = uilabel(app.tunnelingparametersPanel\_2);

app.egLabel\_7.HorizontalAlignment = 'right';

app.egLabel\_7.Position = [19 141 25 22];

app.egLabel\_7.Text = 'eg';

app.egEditField\_7 = uispinner(app.tunnelingparametersPanel\_2);

app.egEditField\_7.Step = 0.001;

app.egEditField\_7.Limits = [0 5];

app.egEditField\_7.Position = [53 140 66 22];

app.egEditField\_7.Value = 0.5;

app.grLabel\_3 = uilabel(app.tunnelingparametersPanel\_2);

app.grLabel\_3.HorizontalAlignment = 'right';

app.grLabel\_3.Position = [193 142 25 22];

app.grLabel\_3.Text = 'gr';

app.grEditField\_20 = uispinner(app.tunnelingparametersPanel\_2);

app.grEditField\_20.Step = 0.001;

app.grEditField\_20.Limits = [0.001 5];

app.grEditField\_20.Position = [227 141 66 22];

app.grEditField\_20.Value = 0.005;

app.glLabel\_3 = uilabel(app.tunnelingparametersPanel\_2);

app.glLabel\_3.HorizontalAlignment = 'right';

app.glLabel\_3.Position = [372 141 25 22];

app.glLabel\_3.Text = 'gl';

app.glEditField\_7 = uispinner(app.tunnelingparametersPanel\_2);

app.glEditField\_7.Step = 0.001;

app.glEditField\_7.Limits = [0.001 5];

app.glEditField\_7.Position = [406 140 66 22];

app.glEditField\_7.Value = 0.005;

app.voltagescalePanel\_8 = uipanel(app.thermoelectricTab);

app.voltagescalePanel\_8.BorderType = 'none';

app.voltagescalePanel\_8.Title = 'voltage scale';

app.voltagescalePanel\_8.BackgroundColor = [1 1 1];

app.voltagescalePanel\_8.FontWeight = 'bold';

app.voltagescalePanel\_8.Position = [1 281 534 94];

app.voltagestepEditField\_2Label = uilabel(app.voltagescalePanel\_8);

app.voltagestepEditField\_2Label.HorizontalAlignment = 'right';

app.voltagestepEditField\_2Label.Position = [6 10 72 22];

app.voltagestepEditField\_2Label.Text = 'voltage step';

app.voltagestepEditField\_2 = uieditfield(app.voltagescalePanel\_8, 'numeric');

app.voltagestepEditField\_2.Position = [94 10 100 22];

app.voltagestepEditField\_2.Value = 100;

app.Slider\_9 = uislider(app.voltagescalePanel\_8);

app.Slider\_9.Limits = [0 5];

app.Slider\_9.ValueChangedFcn = createCallbackFcn(app, @Slider\_9ValueChanged, true);

app.Slider\_9.Position = [227 47 251 3];

app.Slider\_9.Value = 1.5;

app.voltagescaleLabel\_2 = uilabel(app.voltagescalePanel\_8);

app.voltagescaleLabel\_2.HorizontalAlignment = 'right';

app.voltagescaleLabel\_2.Position = [0 45 79 22];

app.voltagescaleLabel\_2.Text = 'voltage scale';

app.voltageEditField\_10 = uispinner(app.voltagescalePanel\_8);

app.voltageEditField\_10.Step = 0.1;

app.voltageEditField\_10.Limits = [0 5];

app.voltageEditField\_10.Position = [93 44 109 22];

app.voltageEditField\_10.Value = 1.5;

app.resultPanel\_8 = uipanel(app.thermoelectricTab);

app.resultPanel\_8.BorderType = 'none';

app.resultPanel\_8.Title = 'result';

app.resultPanel\_8.BackgroundColor = [1 1 1];

app.resultPanel\_8.FontWeight = 'bold';

app.resultPanel\_8.Position = [543 1 400 596];

app.UIAxes\_8 = uiaxes(app.resultPanel\_8);

title(app.UIAxes\_8, '')

xlabel(app.UIAxes\_8, 'Voltage/V')

ylabel(app.UIAxes\_8, 'I/A')

app.UIAxes\_8.PlotBoxAspectRatio = [1.8855421686747 1 1];

app.UIAxes\_8.TitleFontWeight = 'bold';

app.UIAxes\_8.BackgroundColor = [1 1 1];

app.UIAxes\_8.Position = [1 299 391 278];

app.UIAxeslog\_8 = uiaxes(app.resultPanel\_8);

title(app.UIAxeslog\_8, '')

xlabel(app.UIAxeslog\_8, 'Voltage/V')

ylabel(app.UIAxeslog\_8, 'Log(I)')

app.UIAxeslog\_8.PlotBoxAspectRatio = [1.86309523809524 1 1];

app.UIAxeslog\_8.TitleFontWeight = 'bold';

app.UIAxeslog\_8.BackgroundColor = [1 1 1];

app.UIAxeslog\_8.Position = [2 12 391 288];

app.zerobiasthermocurrentPanel = uipanel(app.thermoelectricTab);

app.zerobiasthermocurrentPanel.BorderType = 'none';

app.zerobiasthermocurrentPanel.Title = 'zero bias thermocurrent ';

app.zerobiasthermocurrentPanel.BackgroundColor = [1 1 1];

app.zerobiasthermocurrentPanel.FontWeight = 'bold';

app.zerobiasthermocurrentPanel.Position = [1 1 534 116];

app.Slider\_13 = uislider(app.zerobiasthermocurrentPanel);

app.Slider\_13.Limits = [0 1000];

app.Slider\_13.MajorTicks = [0 100 200 300 400 500 600 700 800 900 1000];

app.Slider\_13.MajorTickLabels = {'0', '100', '200', '300', '400', '500', '600', '700', '800', '900', '1000'};

app.Slider\_13.ValueChangedFcn = createCallbackFcn(app, @Slider\_13ValueChanged, true);

app.Slider\_13.MinorTicks = [];

app.Slider\_13.Position = [230 82 251 3];

app.Slider\_13.Value = 300;

app.TdifferenceLabel = uilabel(app.zerobiasthermocurrentPanel);

app.TdifferenceLabel.HorizontalAlignment = 'right';

app.TdifferenceLabel.Position = [12 13 69 22];

app.TdifferenceLabel.Text = 'T difference';

app.alpha05EditField\_7 = uispinner(app.zerobiasthermocurrentPanel);

app.alpha05EditField\_7.Position = [90 12 99 22];

app.leftelectrodeLabel = uilabel(app.zerobiasthermocurrentPanel);

app.leftelectrodeLabel.HorizontalAlignment = 'right';

app.leftelectrodeLabel.Position = [9 61 75 22];

app.leftelectrodeLabel.Text = 'left electrode';

app.alpha05EditField\_8 = uispinner(app.zerobiasthermocurrentPanel);

app.alpha05EditField\_8.Limits = [0 Inf];

app.alpha05EditField\_8.Position = [93 60 99 22];

app.alpha05EditField\_8.Value = 300;

app.Slider\_14 = uislider(app.zerobiasthermocurrentPanel);

app.Slider\_14.Limits = [0 1000];

app.Slider\_14.MajorTicks = [0 200 400 600 800 1000];

app.Slider\_14.ValueChangedFcn = createCallbackFcn(app, @Slider\_14ValueChanged, true);

app.Slider\_14.MinorTicks = [];

app.Slider\_14.Position = [231 33 251 3];

app.SimuButton\_5 = uibutton(app.thermoelectricTab, 'push');

app.SimuButton\_5.ButtonPushedFcn = createCallbackFcn(app, @SimuButton\_5Pushed, true);

app.SimuButton\_5.BackgroundColor = [0.651 0.651 0.651];

app.SimuButton\_5.FontSize = 20;

app.SimuButton\_5.FontWeight = 'bold';

app.SimuButton\_5.FontColor = [1 1 0];

app.SimuButton\_5.Position = [946 417 99 79];

app.SimuButton\_5.Text = 'Simu';

app.Image2\_8 = uiimage(app.thermoelectricTab);

app.Image2\_8.Position = [960 510 70 78];

app.Image2\_8.ImageSource = 'xiaohui.jpg';

app.electrodetemperaturePanel = uipanel(app.thermoelectricTab);

app.electrodetemperaturePanel.BorderType = 'none';

app.electrodetemperaturePanel.Title = 'electrode temperature';

app.electrodetemperaturePanel.BackgroundColor = [1 1 1];

app.electrodetemperaturePanel.FontWeight = 'bold';

app.electrodetemperaturePanel.Position = [1 116 534 166];

app.Slider\_11 = uislider(app.electrodetemperaturePanel);

app.Slider\_11.Limits = [0 1000];

app.Slider\_11.MajorTicks = [0 100 200 300 400 500 600 700 800 900 1000];

app.Slider\_11.MajorTickLabels = {'0', '100', '200', '300', '400', '500', '600', '700', '800', '900', '1000'};

app.Slider\_11.ValueChangedFcn = createCallbackFcn(app, @Slider\_11ValueChanged, true);

app.Slider\_11.MinorTicks = [];

app.Slider\_11.Position = [228 103 251 3];

app.Slider\_11.Value = 300;

app.leftLabel = uilabel(app.electrodetemperaturePanel);

app.leftLabel.HorizontalAlignment = 'right';

app.leftLabel.Position = [50 95 34 22];

app.leftLabel.Text = 'left';

app.alpha05EditField\_5 = uispinner(app.electrodetemperaturePanel);

app.alpha05EditField\_5.Limits = [0 Inf];

app.alpha05EditField\_5.Position = [93 94 99 22];

app.alpha05EditField\_5.Value = 300;

app.rightLabel = uilabel(app.electrodetemperaturePanel);

app.rightLabel.HorizontalAlignment = 'right';

app.rightLabel.Position = [50 50 34 22];

app.rightLabel.Text = 'right';

app.alpha05EditField\_6 = uispinner(app.electrodetemperaturePanel);

app.alpha05EditField\_6.Limits = [0 Inf];

app.alpha05EditField\_6.Position = [93 49 99 22];

app.alpha05EditField\_6.Value = 300;

app.Slider\_12 = uislider(app.electrodetemperaturePanel);

app.Slider\_12.Limits = [0 1000];

app.Slider\_12.MajorTicks = [0 100 200 300 400 500 600 700 800 900 1000];

app.Slider\_12.ValueChangedFcn = createCallbackFcn(app, @Slider\_12ValueChanged, true);

app.Slider\_12.MinorTicks = [0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1];

app.Slider\_12.Position = [229 58 251 3];

app.Slider\_12.Value = 300;

app.homeButton = uibutton(app.UIFigure, 'push');

app.homeButton.ButtonPushedFcn = createCallbackFcn(app, @homeButtonPushed, true);

app.homeButton.BackgroundColor = [1 1 1];

app.homeButton.FontSize = 20;

app.homeButton.FontWeight = 'bold';

app.homeButton.Position = [947 1 71 36];

app.homeButton.Text = 'home';

app.Image3 = uiimage(app.UIFigure);

app.Image3.Position = [1 1 535 100];

app.Image3.ImageSource = 'logo\_1.png';

app.Image5 = uiimage(app.UIFigure);

app.Image5.ImageClickedFcn = createCallbackFcn(app, @Image5Clicked, true);

app.Image5.Position = [961 44 43 41];

app.Image5.ImageSource = 'OIP-C.jpg';

app.UIFigure.Visible = 'on';

end

end

methods (Access = public)

function app = simulation

createComponents(app)

registerApp(app, app.UIFigure)

if nargout == 0

clear app

end

end

function delete(app)

delete(app.UIFigure)

end

end

end

classdef dataprocessing < matlab.apps.AppBase

properties (Access = public)

UIFigure matlab.ui.Figure

TabGroup2 matlab.ui.container.TabGroup

TVSTab matlab.ui.container.Tab

selectdataPanel matlab.ui.container.Panel

loadfileButton matlab.ui.control.Button

filepathEditFieldLabel matlab.ui.control.Label

filepathEditField matlab.ui.control.EditField

sheetEditFieldLabel matlab.ui.control.Label

sheetEditField matlab.ui.control.NumericEditField

Panel matlab.ui.container.Panel

lineEditFieldLabel matlab.ui.control.Label

lineEditField matlab.ui.control.EditField

lineEditField\_2Label matlab.ui.control.Label

lineEditField\_2 matlab.ui.control.EditField

toEditFieldLabel matlab.ui.control.Label

toEditField matlab.ui.control.EditField

toEditField\_2Label matlab.ui.control.Label

toEditField\_2 matlab.ui.control.EditField

voltagecolumnincapitalEditFieldLabel matlab.ui.control.Label

voltagecolumnincapitalEditField matlab.ui.control.EditField

currentcolumnincapitalEditFieldLabel matlab.ui.control.Label

currentcolumnincapitalEditField matlab.ui.control.EditField

voltageEditFieldLabel matlab.ui.control.Label

voltageEditField matlab.ui.control.EditField

currentEditFieldLabel matlab.ui.control.Label

currentEditField matlab.ui.control.EditField

UIAxes6 matlab.ui.control.UIAxes

plotButton matlab.ui.control.Button

UIAxes7 matlab.ui.control.UIAxes

savedataPanel matlab.ui.container.Panel

selectfolderButton matlab.ui.control.Button

filepathEditField\_2Label matlab.ui.control.Label

filepathEditField\_2 matlab.ui.control.EditField

filenameEditFieldLabel matlab.ui.control.Label

filenameEditField matlab.ui.control.EditField

saveButton matlab.ui.control.Button

transitionvoltageisEditFieldLabel matlab.ui.control.Label

transitionvoltageisEditField matlab.ui.control.NumericEditField

andEditFieldLabel matlab.ui.control.Label

andEditField matlab.ui.control.NumericEditField

NDCTab matlab.ui.container.Tab

selectdataPanel\_2 matlab.ui.container.Panel

loadfileButton\_2 matlab.ui.control.Button

filepathEditField\_3Label matlab.ui.control.Label

filepathEditField\_3 matlab.ui.control.EditField

sheetEditField\_2Label matlab.ui.control.Label

sheetEditField\_2 matlab.ui.control.NumericEditField

Panel\_2 matlab.ui.container.Panel

lineEditField\_3Label matlab.ui.control.Label

lineEditField\_3 matlab.ui.control.EditField

lineEditField\_4Label matlab.ui.control.Label

lineEditField\_4 matlab.ui.control.EditField

toEditField\_3Label matlab.ui.control.Label

toEditField\_3 matlab.ui.control.EditField

toEditField\_4Label matlab.ui.control.Label

toEditField\_4 matlab.ui.control.EditField

voltagecolumnincapitalEditField\_2Label matlab.ui.control.Label

voltagecolumnincapitalEditField\_2 matlab.ui.control.EditField

currentcolumnincapitalEditField\_2Label matlab.ui.control.Label

currentcolumnincapitalEditField\_2 matlab.ui.control.EditField

voltageEditField\_2Label matlab.ui.control.Label

voltageEditField\_2 matlab.ui.control.EditField

currentEditField\_2Label matlab.ui.control.Label

currentEditField\_2 matlab.ui.control.EditField

UIAxes6\_2 matlab.ui.control.UIAxes

plotButton\_2 matlab.ui.control.Button

savedataPanel\_2 matlab.ui.container.Panel

selectfolderButton\_2 matlab.ui.control.Button

filepathEditField\_4Label matlab.ui.control.Label

filepathEditField\_4 matlab.ui.control.EditField

filenameEditField\_2Label matlab.ui.control.Label

filenameEditField\_2 matlab.ui.control.EditField

saveButton\_2 matlab.ui.control.Button

UIAxes7\_2 matlab.ui.control.UIAxes

homeButton matlab.ui.control.Button

Image3 matlab.ui.control.Image

Image5 matlab.ui.control.Image

end

properties (Access = private)

fileTVS="www";

fileNDC="www";

filefittunneling="www";

voltageTVS;

currentTVS;

voltageNDC;

currentNDC;

voltageNDC2;

currentNDC2;

currentdiffNDC;

end

methods (Access = private)

function returnButtonPushed(app, event)

delete(app.UIFigure);

run cover.mlapp;

end

function loadfileButtonPushed(app, event)

[filename,pathname]=uigetfile({'\*.xls\*','load data'});

if isequal(filename,0)||isequal(pathname,0)

errordlg("haven't select a file",'error');

return;

end

file=strcat(pathname,filename);

app.filepathEditField.Value=file;

end

function voltagecolumnincapitalEditFieldValueChanged(app, event)

value = app.voltagecolumnincapitalEditField.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField.Value);

end

function lineEditFieldValueChanged(app, event)

value = app.lineEditField.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField.Value);

end

function toEditFieldValueChanged(app, event)

value = app.toEditField.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField.Value);

end

function currentcolumnincapitalEditFieldValueChanged(app, event)

value = app.currentcolumnincapitalEditField.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function lineEditField\_2ValueChanged(app, event)

value = app.lineEditField\_2.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function toEditField\_2ValueChanged(app, event)

value = app.toEditField\_2.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function plotButtonPushed(app, event)

app.UIAxes6.cla;

app.UIAxes7.cla;

app.voltageTVS.Value=xlsread(app.filepathEditField.Value,app.sheetEditField.Value,app.voltageEditField.Value);

app.currentTVS.Value=xlsread(app.filepathEditField.Value,app.sheetEditField.Value,app.currentEditField.Value);

m=1;

VV=app.voltageTVS.Value;

for i=1:length(VV)

if VV(i)>=0

m=i-1;

break;

end

end

VVnegative=app.voltageTVS.Value(1:m);

VVpositive=app.voltageTVS.Value(m+1:length(VV));

IIpositive=app.currentTVS.Value(m+1:length(VV));

IInegative=app.currentTVS.Value(1:m);

Ip=find((log(abs(IIpositive./VVpositive.^2)))==min(log(abs(IIpositive./VVpositive.^2))));

In=find((log(abs(IInegative./VVnegative.^2)))==min(log(abs(IInegative./VVnegative.^2))));

app.transitionvoltageisEditField.Value=VVnegative(In);

app.andEditField.Value=VVpositive(Ip);

plot(app.UIAxes6,app.voltageTVS.Value,app.currentTVS.Value,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes6,"on");

xlabel(app.UIAxes6,'Voltage/V','fontsize',18)

ylabel(app.UIAxes6,'|\itI/|','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes6,"off");

scatter(app.UIAxes7,1./app.voltageTVS.Value,log(abs(app.currentTVS.Value./app.voltageTVS.Value.^2)));

hold(app.UIAxes7,"on");

xlabel(app.UIAxes7,'1/Voltage/V','fontsize',18)

ylabel(app.UIAxes7,'ln(I/V^2)','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes7,"off");

end

function selectfolderButtonPushed(app, event)

selpath=uigetdir('\*.\*','choose a folder');

app.filepathEditField\_2.Value=selpath;

end

function saveButtonPushed(app, event)

filename=strcat(app.filepathEditField\_2.Value,'/',app.filenameEditField.Value,'.xlsx');

xlswrite(filename,{'VOLTAGE'},1,'A1');

xlswrite(filename,{'CURRENT'},1,'B1');

xlswrite(filename,{'1/V'},1,'C1');

xlswrite(filename,{'ln(I/V^2)'},1,'D1');

xlswrite(filename,app.voltageTVS.Value,1,'A2');

xlswrite(filename,app.currentTVS.Value,1,'B2');

xlswrite(filename,1./app.voltageTVS.Value,1,'C2');

xlswrite(filename,log(abs(app.currentTVS.Value./app.voltageTVS.Value.^2)),1,'D2');

fig = uifigure;

message = {'success save the data!'};

uialert(fig,message,'save file success','Icon','success');

end

function loadfileButton\_2Pushed(app, event)

[filename,pathname]=uigetfile({'\*.xls\*','load data'});

if isequal(filename,0)||isequal(pathname,0)

errordlg("haven't select a file",'error');

return;

end

file=strcat(pathname,filename);

app.filepathEditField\_3.Value=file;

end

function voltagecolumnincapitalEditField\_2ValueChanged(app, event)

value = app.voltagecolumnincapitalEditField\_2.Value;

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_3.Value);

end

function lineEditField\_3ValueChanged(app, event)

value = app.lineEditField\_3.Value;

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_3.Value);

end

function toEditField\_3ValueChanged(app, event)

value = app.toEditField\_3.Value;

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_3.Value);

end

function currentcolumnincapitalEditField\_2ValueChanged(app, event)

value = app.currentcolumnincapitalEditField\_2.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function lineEditField\_4ValueChanged(app, event)

value = app.lineEditField\_4.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function toEditField\_4ValueChanged(app, event)

value = app.toEditField\_4.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function plotButton\_2Pushed(app, event)

app.UIAxes6\_2.cla;

app.UIAxes7\_2.cla;

app.voltageNDC2.Value(:)=0;

app.currentNDC2.Value(:)=0;

app.currentdiffNDC.Value(:)=0;

app.voltageNDC.Value=xlsread(app.filepathEditField\_3.Value,app.sheetEditField\_2.Value,app.voltageEditField\_2.Value);

app.currentNDC.Value=xlsread(app.filepathEditField\_3.Value,app.sheetEditField\_2.Value,app.currentEditField\_2.Value);

dV=app.voltageNDC.Value(2)-app.voltageNDC.Value(1);

for i=1:length(app.voltageNDC.Value)-3

app.voltageNDC2.Value(i)=app.voltageNDC.Value(i)+2.5\*dV;

app.currentdiffNDC.Value(i)=(app.currentNDC.Value(i+2)+app.currentNDC.Value(i+3)-app.currentNDC.Value(i)-app.currentNDC.Value(i+1))/(4\*dV);

app.currentNDC2.Value(i)=(app.currentNDC.Value(i+2)+app.currentNDC.Value(i+3)+app.currentNDC.Value(i)+app.currentNDC.Value(i+1))/4;

end

plot(app.UIAxes6\_2,app.voltageNDC2.Value(1:i),app.currentNDC2.Value(1:i),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes6\_2,"on");

xlabel(app.UIAxes6\_2,'Voltage/V','fontsize',18)

ylabel(app.UIAxes6\_2,'\itI/','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes6\_2,"off");

plot(app.UIAxes7\_2,app.voltageNDC2.Value(1:i),app.currentdiffNDC.Value(1:i).\*app.voltageNDC2.Value(1:i)./app.currentNDC2.Value(1:i),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes7\_2,"on");

line(app.UIAxes7\_2,[app.voltageNDC2.Value(1),app.voltageNDC2.Value(length(app.voltageNDC2.Value))],[2,2],'linestyle','--')

xlabel(app.UIAxes7\_2,'Voltage/V','fontsize',18)

ylabel(app.UIAxes7\_2,'(dI/dV)V/I','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes7\_2,"off");

end

function selectfolderButton\_2Pushed(app, event)

selpath=uigetdir('\*.\*','choose a folder');

app.filepathEditField\_4.Value=selpath;

end

function saveButton\_2Pushed(app, event)

filename=strcat(app.filepathEditField\_4.Value,'/',app.filenameEditField\_2.Value,'.xlsx');

xlswrite(filename,{'VOLTAGE'},1,'A1');

xlswrite(filename,{'CURRENT'},1,'B1');

xlswrite(filename,{'(dI/dV)V/I'},1,'C1');

xlswrite(filename,app.voltageNDC2.Value',1,'A2');

xlswrite(filename,app.currentNDC2.Value',1,'B2');

xlswrite(filename,(app.currentdiffNDC.Value.\*app.voltageNDC2.Value./app.currentNDC2.Value)',1,'C2');

fig = uifigure;

message = {'success save the data!'};

uialert(fig,message,'save file success','Icon','success');

end

function homeButtonPushed(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

function Image5Clicked(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

end

methods (Access = private)

function createComponents(app)

app.UIFigure = uifigure('Visible', 'off');

app.UIFigure.Color = [1 1 1];

app.UIFigure.Position = [100 100 1092 741];

app.UIFigure.Name = 'UI Figure';

app.TabGroup2 = uitabgroup(app.UIFigure);

app.TabGroup2.Position = [1 100 1092 642];

app.TVSTab = uitab(app.TabGroup2);

app.TVSTab.Title = 'TVS';

app.TVSTab.BackgroundColor = [1 1 1];

app.selectdataPanel = uipanel(app.TVSTab);

app.selectdataPanel.BorderType = 'none';

app.selectdataPanel.Title = 'select data';

app.selectdataPanel.BackgroundColor = [1 1 1];

app.selectdataPanel.Position = [1 495 368 122];

app.loadfileButton = uibutton(app.selectdataPanel, 'push');

app.loadfileButton.ButtonPushedFcn = createCallbackFcn(app, @loadfileButtonPushed, true);

app.loadfileButton.Position = [275 60 78 22];

app.loadfileButton.Text = 'load file';

app.filepathEditFieldLabel = uilabel(app.selectdataPanel);

app.filepathEditFieldLabel.HorizontalAlignment = 'right';

app.filepathEditFieldLabel.Position = [10 60 47 22];

app.filepathEditFieldLabel.Text = 'file path';

app.filepathEditField = uieditfield(app.selectdataPanel, 'text');

app.filepathEditField.Position = [72 60 188 22];

app.filepathEditField.Value = '0';

app.sheetEditFieldLabel = uilabel(app.selectdataPanel);

app.sheetEditFieldLabel.HorizontalAlignment = 'right';

app.sheetEditFieldLabel.Position = [20 21 35 22];

app.sheetEditFieldLabel.Text = 'sheet';

app.sheetEditField = uieditfield(app.selectdataPanel, 'numeric');

app.sheetEditField.Position = [70 21 100 22];

app.sheetEditField.Value = 1;

app.Panel = uipanel(app.TVSTab);

app.Panel.BorderType = 'none';

app.Panel.BackgroundColor = [1 1 1];

app.Panel.Position = [1 357 366 139];

app.lineEditFieldLabel = uilabel(app.Panel);

app.lineEditFieldLabel.HorizontalAlignment = 'right';

app.lineEditFieldLabel.Position = [213 108 25 22];

app.lineEditFieldLabel.Text = 'line';

app.lineEditField = uieditfield(app.Panel, 'text');

app.lineEditField.ValueChangedFcn = createCallbackFcn(app, @lineEditFieldValueChanged, true);

app.lineEditField.Position = [241 108 40 22];

app.lineEditField.Value = '1';

app.lineEditField\_2Label = uilabel(app.Panel);

app.lineEditField\_2Label.HorizontalAlignment = 'right';

app.lineEditField\_2Label.Position = [213 68 25 22];

app.lineEditField\_2Label.Text = 'line';

app.lineEditField\_2 = uieditfield(app.Panel, 'text');

app.lineEditField\_2.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_2ValueChanged, true);

app.lineEditField\_2.Position = [241 68 40 22];

app.lineEditField\_2.Value = '1';

app.toEditFieldLabel = uilabel(app.Panel);

app.toEditFieldLabel.HorizontalAlignment = 'right';

app.toEditFieldLabel.Position = [272 108 25 22];

app.toEditFieldLabel.Text = 'to';

app.toEditField = uieditfield(app.Panel, 'text');

app.toEditField.ValueChangedFcn = createCallbackFcn(app, @toEditFieldValueChanged, true);

app.toEditField.Position = [311 108 40 22];

app.toEditField.Value = '120';

app.toEditField\_2Label = uilabel(app.Panel);

app.toEditField\_2Label.HorizontalAlignment = 'right';

app.toEditField\_2Label.Position = [272 68 25 22];

app.toEditField\_2Label.Text = 'to';

app.toEditField\_2 = uieditfield(app.Panel, 'text');

app.toEditField\_2.ValueChangedFcn = createCallbackFcn(app, @toEditField\_2ValueChanged, true);

app.toEditField\_2.Position = [311 68 40 22];

app.toEditField\_2.Value = '120';

app.voltagecolumnincapitalEditFieldLabel = uilabel(app.Panel);

app.voltagecolumnincapitalEditFieldLabel.HorizontalAlignment = 'right';

app.voltagecolumnincapitalEditFieldLabel.Position = [18 108 142 22];

app.voltagecolumnincapitalEditFieldLabel.Text = 'voltage column(in capital)';

app.voltagecolumnincapitalEditField = uieditfield(app.Panel, 'text');

app.voltagecolumnincapitalEditField.ValueChangedFcn = createCallbackFcn(app, @voltagecolumnincapitalEditFieldValueChanged, true);

app.voltagecolumnincapitalEditField.Position = [162 108 40 22];

app.voltagecolumnincapitalEditField.Value = 'A';

app.currentcolumnincapitalEditFieldLabel = uilabel(app.Panel);

app.currentcolumnincapitalEditFieldLabel.HorizontalAlignment = 'right';

app.currentcolumnincapitalEditFieldLabel.Position = [19 68 140 22];

app.currentcolumnincapitalEditFieldLabel.Text = 'current column(in capital)';

app.currentcolumnincapitalEditField = uieditfield(app.Panel, 'text');

app.currentcolumnincapitalEditField.ValueChangedFcn = createCallbackFcn(app, @currentcolumnincapitalEditFieldValueChanged, true);

app.currentcolumnincapitalEditField.Position = [162 68 40 22];

app.currentcolumnincapitalEditField.Value = 'B';

app.voltageEditFieldLabel = uilabel(app.Panel);

app.voltageEditFieldLabel.HorizontalAlignment = 'right';

app.voltageEditFieldLabel.Position = [11 38 44 22];

app.voltageEditFieldLabel.Text = 'voltage';

app.voltageEditField = uieditfield(app.Panel, 'text');

app.voltageEditField.Position = [70 38 188 22];

app.voltageEditField.Value = 'A1:A120';

app.currentEditFieldLabel = uilabel(app.Panel);

app.currentEditFieldLabel.HorizontalAlignment = 'right';

app.currentEditFieldLabel.Position = [12 5 43 22];

app.currentEditFieldLabel.Text = 'current';

app.currentEditField = uieditfield(app.Panel, 'text');

app.currentEditField.Position = [70 5 188 22];

app.currentEditField.Value = 'B1:B120';

app.UIAxes6 = uiaxes(app.TVSTab);

title(app.UIAxes6, 'data')

xlabel(app.UIAxes6, 'voltage')

ylabel(app.UIAxes6, 'current')

app.UIAxes6.PlotBoxAspectRatio = [1.43636363636364 1 1];

app.UIAxes6.FontWeight = 'bold';

app.UIAxes6.TitleFontWeight = 'bold';

app.UIAxes6.BackgroundColor = [1 1 1];

app.UIAxes6.Position = [406 21 635 292];

app.plotButton = uibutton(app.TVSTab, 'push');

app.plotButton.ButtonPushedFcn = createCallbackFcn(app, @plotButtonPushed, true);

app.plotButton.Position = [263 330 100 22];

app.plotButton.Text = 'plot';

app.UIAxes7 = uiaxes(app.TVSTab);

title(app.UIAxes7, 'TVS')

xlabel(app.UIAxes7, '1/V')

ylabel(app.UIAxes7, 'ln(I/V^2)')

app.UIAxes7.PlotBoxAspectRatio = [1.49090909090909 1 1];

app.UIAxes7.FontWeight = 'bold';

app.UIAxes7.TitleFontWeight = 'bold';

app.UIAxes7.BackgroundColor = [1 1 1];

app.UIAxes7.Position = [406 336 635 278];

app.savedataPanel = uipanel(app.TVSTab);

app.savedataPanel.BorderType = 'none';

app.savedataPanel.Title = 'save data';

app.savedataPanel.BackgroundColor = [1 1 1];

app.savedataPanel.Position = [1 115 368 122];

app.selectfolderButton = uibutton(app.savedataPanel, 'push');

app.selectfolderButton.ButtonPushedFcn = createCallbackFcn(app, @selectfolderButtonPushed, true);

app.selectfolderButton.Position = [274 60 80 22];

app.selectfolderButton.Text = 'select folder';

app.filepathEditField\_2Label = uilabel(app.savedataPanel);

app.filepathEditField\_2Label.HorizontalAlignment = 'right';

app.filepathEditField\_2Label.Position = [10 60 47 22];

app.filepathEditField\_2Label.Text = 'file path';

app.filepathEditField\_2 = uieditfield(app.savedataPanel, 'text');

app.filepathEditField\_2.Position = [72 60 188 22];

app.filepathEditField\_2.Value = '0';

app.filenameEditFieldLabel = uilabel(app.savedataPanel);

app.filenameEditFieldLabel.HorizontalAlignment = 'right';

app.filenameEditFieldLabel.Position = [6 22 51 22];

app.filenameEditFieldLabel.Text = 'filename';

app.filenameEditField = uieditfield(app.savedataPanel, 'text');

app.filenameEditField.Position = [72 22 188 22];

app.filenameEditField.Value = '1';

app.saveButton = uibutton(app.savedataPanel, 'push');

app.saveButton.ButtonPushedFcn = createCallbackFcn(app, @saveButtonPushed, true);

app.saveButton.Position = [270 22 87 22];

app.saveButton.Text = 'save';

app.transitionvoltageisEditFieldLabel = uilabel(app.TVSTab);

app.transitionvoltageisEditFieldLabel.HorizontalAlignment = 'right';

app.transitionvoltageisEditFieldLabel.Position = [6 77 108 22];

app.transitionvoltageisEditFieldLabel.Text = 'transition voltage is';

app.transitionvoltageisEditField = uieditfield(app.TVSTab, 'numeric');

app.transitionvoltageisEditField.Position = [129 77 100 22];

app.andEditFieldLabel = uilabel(app.TVSTab);

app.andEditFieldLabel.HorizontalAlignment = 'right';

app.andEditFieldLabel.Position = [88 36 26 22];

app.andEditFieldLabel.Text = 'and';

app.andEditField = uieditfield(app.TVSTab, 'numeric');

app.andEditField.Position = [129 36 100 22];

app.NDCTab = uitab(app.TabGroup2);

app.NDCTab.Title = 'NDC';

app.NDCTab.BackgroundColor = [1 1 1];

app.selectdataPanel\_2 = uipanel(app.NDCTab);

app.selectdataPanel\_2.BorderType = 'none';

app.selectdataPanel\_2.Title = 'select data';

app.selectdataPanel\_2.BackgroundColor = [1 1 1];

app.selectdataPanel\_2.Position = [0 496 368 122];

app.loadfileButton\_2 = uibutton(app.selectdataPanel\_2, 'push');

app.loadfileButton\_2.ButtonPushedFcn = createCallbackFcn(app, @loadfileButton\_2Pushed, true);

app.loadfileButton\_2.Position = [275 60 78 22];

app.loadfileButton\_2.Text = 'load file';

app.filepathEditField\_3Label = uilabel(app.selectdataPanel\_2);

app.filepathEditField\_3Label.HorizontalAlignment = 'right';

app.filepathEditField\_3Label.Position = [10 60 47 22];

app.filepathEditField\_3Label.Text = 'file path';

app.filepathEditField\_3 = uieditfield(app.selectdataPanel\_2, 'text');

app.filepathEditField\_3.Position = [72 60 188 22];

app.filepathEditField\_3.Value = '0';

app.sheetEditField\_2Label = uilabel(app.selectdataPanel\_2);

app.sheetEditField\_2Label.HorizontalAlignment = 'right';

app.sheetEditField\_2Label.Position = [20 21 35 22];

app.sheetEditField\_2Label.Text = 'sheet';

app.sheetEditField\_2 = uieditfield(app.selectdataPanel\_2, 'numeric');

app.sheetEditField\_2.Position = [70 21 100 22];

app.sheetEditField\_2.Value = 1;

app.Panel\_2 = uipanel(app.NDCTab);

app.Panel\_2.BorderType = 'none';

app.Panel\_2.BackgroundColor = [1 1 1];

app.Panel\_2.Position = [0 360 366 139];

app.lineEditField\_3Label = uilabel(app.Panel\_2);

app.lineEditField\_3Label.HorizontalAlignment = 'right';

app.lineEditField\_3Label.Position = [213 108 25 22];

app.lineEditField\_3Label.Text = 'line';

app.lineEditField\_3 = uieditfield(app.Panel\_2, 'text');

app.lineEditField\_3.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_3ValueChanged, true);

app.lineEditField\_3.Position = [241 108 40 22];

app.lineEditField\_3.Value = '1';

app.lineEditField\_4Label = uilabel(app.Panel\_2);

app.lineEditField\_4Label.HorizontalAlignment = 'right';

app.lineEditField\_4Label.Position = [213 68 25 22];

app.lineEditField\_4Label.Text = 'line';

app.lineEditField\_4 = uieditfield(app.Panel\_2, 'text');

app.lineEditField\_4.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_4ValueChanged, true);

app.lineEditField\_4.Position = [241 68 40 22];

app.lineEditField\_4.Value = '1';

app.toEditField\_3Label = uilabel(app.Panel\_2);

app.toEditField\_3Label.HorizontalAlignment = 'right';

app.toEditField\_3Label.Position = [272 108 25 22];

app.toEditField\_3Label.Text = 'to';

app.toEditField\_3 = uieditfield(app.Panel\_2, 'text');

app.toEditField\_3.ValueChangedFcn = createCallbackFcn(app, @toEditField\_3ValueChanged, true);

app.toEditField\_3.Position = [311 108 40 22];

app.toEditField\_3.Value = '120';

app.toEditField\_4Label = uilabel(app.Panel\_2);

app.toEditField\_4Label.HorizontalAlignment = 'right';

app.toEditField\_4Label.Position = [272 68 25 22];

app.toEditField\_4Label.Text = 'to';

app.toEditField\_4 = uieditfield(app.Panel\_2, 'text');

app.toEditField\_4.ValueChangedFcn = createCallbackFcn(app, @toEditField\_4ValueChanged, true);

app.toEditField\_4.Position = [311 68 40 22];

app.toEditField\_4.Value = '120';

app.voltagecolumnincapitalEditField\_2Label = uilabel(app.Panel\_2);

app.voltagecolumnincapitalEditField\_2Label.HorizontalAlignment = 'right';

app.voltagecolumnincapitalEditField\_2Label.Position = [18 108 142 22];

app.voltagecolumnincapitalEditField\_2Label.Text = 'voltage column(in capital)';

app.voltagecolumnincapitalEditField\_2 = uieditfield(app.Panel\_2, 'text');

app.voltagecolumnincapitalEditField\_2.ValueChangedFcn = createCallbackFcn(app, @voltagecolumnincapitalEditField\_2ValueChanged, true);

app.voltagecolumnincapitalEditField\_2.Position = [162 108 40 22];

app.voltagecolumnincapitalEditField\_2.Value = 'A';

app.currentcolumnincapitalEditField\_2Label = uilabel(app.Panel\_2);

app.currentcolumnincapitalEditField\_2Label.HorizontalAlignment = 'right';

app.currentcolumnincapitalEditField\_2Label.Position = [19 68 140 22];

app.currentcolumnincapitalEditField\_2Label.Text = 'current column(in capital)';

app.currentcolumnincapitalEditField\_2 = uieditfield(app.Panel\_2, 'text');

app.currentcolumnincapitalEditField\_2.ValueChangedFcn = createCallbackFcn(app, @currentcolumnincapitalEditField\_2ValueChanged, true);

app.currentcolumnincapitalEditField\_2.Position = [162 68 40 22];

app.currentcolumnincapitalEditField\_2.Value = 'B';

app.voltageEditField\_2Label = uilabel(app.Panel\_2);

app.voltageEditField\_2Label.HorizontalAlignment = 'right';

app.voltageEditField\_2Label.Position = [11 38 44 22];

app.voltageEditField\_2Label.Text = 'voltage';

app.voltageEditField\_2 = uieditfield(app.Panel\_2, 'text');

app.voltageEditField\_2.Position = [70 38 188 22];

app.voltageEditField\_2.Value = 'A1:A120';

app.currentEditField\_2Label = uilabel(app.Panel\_2);

app.currentEditField\_2Label.HorizontalAlignment = 'right';

app.currentEditField\_2Label.Position = [12 5 43 22];

app.currentEditField\_2Label.Text = 'current';

app.currentEditField\_2 = uieditfield(app.Panel\_2, 'text');

app.currentEditField\_2.Position = [70 5 188 22];

app.currentEditField\_2.Value = 'B1:B120';

app.UIAxes6\_2 = uiaxes(app.NDCTab);

title(app.UIAxes6\_2, 'data')

xlabel(app.UIAxes6\_2, 'voltage')

ylabel(app.UIAxes6\_2, 'current')

app.UIAxes6\_2.FontWeight = 'bold';

app.UIAxes6\_2.TitleFontWeight = 'bold';

app.UIAxes6\_2.BackgroundColor = [1 1 1];

app.UIAxes6\_2.Position = [422 339 613 278];

app.plotButton\_2 = uibutton(app.NDCTab, 'push');

app.plotButton\_2.ButtonPushedFcn = createCallbackFcn(app, @plotButton\_2Pushed, true);

app.plotButton\_2.Position = [263 330 100 22];

app.plotButton\_2.Text = 'plot';

app.savedataPanel\_2 = uipanel(app.NDCTab);

app.savedataPanel\_2.BorderType = 'none';

app.savedataPanel\_2.Title = 'save data';

app.savedataPanel\_2.BackgroundColor = [1 1 1];

app.savedataPanel\_2.Position = [1 84 401 122];

app.selectfolderButton\_2 = uibutton(app.savedataPanel\_2, 'push');

app.selectfolderButton\_2.ButtonPushedFcn = createCallbackFcn(app, @selectfolderButton\_2Pushed, true);

app.selectfolderButton\_2.Position = [274 60 92 22];

app.selectfolderButton\_2.Text = 'select folder';

app.filepathEditField\_4Label = uilabel(app.savedataPanel\_2);

app.filepathEditField\_4Label.HorizontalAlignment = 'right';

app.filepathEditField\_4Label.Position = [10 60 47 22];

app.filepathEditField\_4Label.Text = 'file path';

app.filepathEditField\_4 = uieditfield(app.savedataPanel\_2, 'text');

app.filepathEditField\_4.Position = [72 60 188 22];

app.filepathEditField\_4.Value = '0';

app.filenameEditField\_2Label = uilabel(app.savedataPanel\_2);

app.filenameEditField\_2Label.HorizontalAlignment = 'right';

app.filenameEditField\_2Label.Position = [6 22 51 22];

app.filenameEditField\_2Label.Text = 'filename';

app.filenameEditField\_2 = uieditfield(app.savedataPanel\_2, 'text');

app.filenameEditField\_2.Position = [72 22 188 22];

app.filenameEditField\_2.Value = '1';

app.saveButton\_2 = uibutton(app.savedataPanel\_2, 'push');

app.saveButton\_2.ButtonPushedFcn = createCallbackFcn(app, @saveButton\_2Pushed, true);

app.saveButton\_2.Position = [270 22 98 22];

app.saveButton\_2.Text = 'save';

app.UIAxes7\_2 = uiaxes(app.NDCTab);

title(app.UIAxes7\_2, 'NDC')

xlabel(app.UIAxes7\_2, '1/V')

ylabel(app.UIAxes7\_2, '(dI/dV)V/I')

app.UIAxes7\_2.FontWeight = 'bold';

app.UIAxes7\_2.TitleFontWeight = 'bold';

app.UIAxes7\_2.BackgroundColor = [1 1 1];

app.UIAxes7\_2.Position = [422 38 613 278];

app.homeButton = uibutton(app.UIFigure, 'push');

app.homeButton.ButtonPushedFcn = createCallbackFcn(app, @homeButtonPushed, true);

app.homeButton.BackgroundColor = [1 1 1];

app.homeButton.FontSize = 20;

app.homeButton.FontWeight = 'bold';

app.homeButton.Position = [947 1 71 36];

app.homeButton.Text = 'home';

app.Image3 = uiimage(app.UIFigure);

app.Image3.Position = [1 1 535 100];

app.Image3.ImageSource = 'logo\_1.png';

app.Image5 = uiimage(app.UIFigure);

app.Image5.ImageClickedFcn = createCallbackFcn(app, @Image5Clicked, true);

app.Image5.Position = [961 44 43 41];

app.Image5.ImageSource = 'OIP-C.jpg';

app.UIFigure.Visible = 'on';

end

end

methods (Access = public)

function app = dataprocessing

createComponents(app)

registerApp(app, app.UIFigure)

if nargout == 0

clear app

end

end

function delete(app)

delete(app.UIFigure)

end

end

end

classdef fitting < matlab.apps.AppBase

properties (Access = public)

UIFigure matlab.ui.Figure

TabGroup2 matlab.ui.container.TabGroup

tunnelingTab matlab.ui.container.Tab

selectdataPanel matlab.ui.container.Panel

loadfileButton matlab.ui.control.Button

filepathEditFieldLabel matlab.ui.control.Label

filepathEditField matlab.ui.control.EditField

sheetEditFieldLabel matlab.ui.control.Label

sheetEditField matlab.ui.control.NumericEditField

Panel matlab.ui.container.Panel

lineEditFieldLabel matlab.ui.control.Label

lineEditField matlab.ui.control.EditField

lineEditField\_2Label matlab.ui.control.Label

lineEditField\_2 matlab.ui.control.EditField

toEditField\_2Label matlab.ui.control.Label

toEditField\_2 matlab.ui.control.EditField

toEditField\_3Label matlab.ui.control.Label

toEditField\_3 matlab.ui.control.EditField

voltagecolumnincapitalEditFieldLabel matlab.ui.control.Label

voltagecolumnincapitalEditField matlab.ui.control.EditField

currentcolumnincapitalEditFieldLabel matlab.ui.control.Label

currentcolumnincapitalEditField matlab.ui.control.EditField

voltageEditFieldLabel matlab.ui.control.Label

voltageEditField matlab.ui.control.EditField

currentEditFieldLabel matlab.ui.control.Label

currentEditField matlab.ui.control.EditField

fitButton matlab.ui.control.Button

savedataPanel matlab.ui.container.Panel

selectfolderButton matlab.ui.control.Button

filepathEditField\_2Label matlab.ui.control.Label

filepathEditField\_2 matlab.ui.control.EditField

filenameEditFieldLabel matlab.ui.control.Label

filenameEditField matlab.ui.control.EditField

saveButton matlab.ui.control.Button

Panel\_3 matlab.ui.container.Panel

egEditFieldLabel matlab.ui.control.Label

egEditField matlab.ui.control.NumericEditField

grEditFieldLabel matlab.ui.control.Label

grEditField matlab.ui.control.NumericEditField

glEditFieldLabel matlab.ui.control.Label

glEditField matlab.ui.control.NumericEditField

alphaEditFieldLabel matlab.ui.control.Label

alphaEditField matlab.ui.control.NumericEditField

fittingplotVfromEditFieldLabel matlab.ui.control.Label

fittingplotVfromEditField matlab.ui.control.NumericEditField

toEditFieldLabel matlab.ui.control.Label

toEditField matlab.ui.control.NumericEditField

UIAxes6\_3 matlab.ui.control.UIAxes

UIAxes7\_3 matlab.ui.control.UIAxes

fittingmethodDropDown\_3Label matlab.ui.control.Label

fittingmethodDropDown matlab.ui.control.DropDown

hoppingTab matlab.ui.container.Tab

selectdataPanel\_2 matlab.ui.container.Panel

loadfileButton\_2 matlab.ui.control.Button

filepathEditField\_3Label matlab.ui.control.Label

filepathEditField\_3 matlab.ui.control.EditField

sheetEditField\_2Label matlab.ui.control.Label

sheetEditField\_2 matlab.ui.control.NumericEditField

Panel\_4 matlab.ui.container.Panel

lineEditField\_3Label matlab.ui.control.Label

lineEditField\_3 matlab.ui.control.EditField

lineEditField\_4Label matlab.ui.control.Label

lineEditField\_4 matlab.ui.control.EditField

toEditField\_4Label matlab.ui.control.Label

toEditField\_4 matlab.ui.control.EditField

toEditField\_5Label matlab.ui.control.Label

toEditField\_5 matlab.ui.control.EditField

voltagecolumnincapitalEditField\_2Label matlab.ui.control.Label

voltagecolumnincapitalEditField\_2 matlab.ui.control.EditField

currentcolumnincapitalEditField\_2Label matlab.ui.control.Label

currentcolumnincapitalEditField\_2 matlab.ui.control.EditField

voltageEditField\_2Label matlab.ui.control.Label

voltageEditField\_2 matlab.ui.control.EditField

currentEditField\_2Label matlab.ui.control.Label

currentEditField\_2 matlab.ui.control.EditField

fitButton\_2 matlab.ui.control.Button

savedataPanel\_2 matlab.ui.container.Panel

selectfolderButton\_2 matlab.ui.control.Button

filepathEditField\_4Label matlab.ui.control.Label

filepathEditField\_4 matlab.ui.control.EditField

filenameEditField\_2Label matlab.ui.control.Label

filenameEditField\_2 matlab.ui.control.EditField

saveButton\_2 matlab.ui.control.Button

Panel\_5 matlab.ui.container.Panel

egEditField\_2Label matlab.ui.control.Label

egEditField\_2 matlab.ui.control.NumericEditField

grEditField\_2Label matlab.ui.control.Label

grEditField\_2 matlab.ui.control.NumericEditField

glEditField\_2Label matlab.ui.control.Label

glEditField\_2 matlab.ui.control.NumericEditField

alphaEditField\_2Label matlab.ui.control.Label

alphaEditField\_2 matlab.ui.control.NumericEditField

fittingplotVfromEditField\_2Label matlab.ui.control.Label

fittingplotVfromEditField\_2 matlab.ui.control.NumericEditField

toEditField\_6Label matlab.ui.control.Label

toEditField\_6 matlab.ui.control.NumericEditField

lambdaEditFieldLabel matlab.ui.control.Label

lambdaEditField matlab.ui.control.NumericEditField

grEditField\_2Label\_2 matlab.ui.control.Label

grEditField\_2Label\_3 matlab.ui.control.Label

UIAxes6\_4 matlab.ui.control.UIAxes

UIAxes7\_4 matlab.ui.control.UIAxes

fittingmethodDropDown\_3Label\_2 matlab.ui.control.Label

fittingmethodDropDown\_2 matlab.ui.control.DropDown

homeButton matlab.ui.control.Button

Image3 matlab.ui.control.Image

Image5 matlab.ui.control.Image

end

properties (Access = private)

voltagefittun;

currentfittun;

voltagefithop;

currentfithop;

Vfittun;

Ifittun;

Vfithop;

Ifithop;

end

methods (Access = private)

function returnButtonPushed(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

function tunnelingTabSizeChanged(app, event)

end

function Image5Clicked(app, event)

delete(app.UIFigure);

run coverr.mlapp;

end

function loadfileButtonPushed(app, event)

[filename,pathname]=uigetfile({'\*.xls\*','load data'});

if isequal(filename,0)||isequal(pathname,0)

errordlg("haven't select a file",'error');

return;

end

file=strcat(pathname,filename);

app.filepathEditField.Value=file;

end

function voltagecolumnincapitalEditFieldValueChanged(app, event)

value = app.voltagecolumnincapitalEditField.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function lineEditFieldValueChanged(app, event)

value = app.lineEditField.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function toEditField\_2ValueChanged(app, event)

value = app.toEditField\_2.Value;

app.voltageEditField.Value=strcat(app.voltagecolumnincapitalEditField.Value,app.lineEditField.Value,":",app.voltagecolumnincapitalEditField.Value,app.toEditField\_2.Value);

end

function currentcolumnincapitalEditFieldValueChanged(app, event)

value = app.currentcolumnincapitalEditField.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_3.Value);

end

function lineEditField\_2ValueChanged(app, event)

value = app.lineEditField\_2.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_3.Value);

end

function toEditField\_3ValueChanged(app, event)

value = app.toEditField\_3.Value;

app.currentEditField.Value=strcat(app.currentcolumnincapitalEditField.Value,app.lineEditField\_2.Value,":",app.currentcolumnincapitalEditField.Value,app.toEditField\_3.Value);

end

function fitButtonPushed(app, event)

app.UIAxes6\_3.cla;

app.UIAxes7\_3.cla;

app.voltagefittun.Value=xlsread(app.filepathEditField.Value,app.sheetEditField.Value,app.voltageEditField.Value);

app.currentfittun.Value=xlsread(app.filepathEditField.Value,app.sheetEditField.Value,app.currentEditField.Value);

eg=app.egEditField.Value;

gr=app.grEditField.Value;

gl=app.glEditField.Value;

alpha=app.alphaEditField.Value;

IT=app.currentfittun.Value';

VT2=app.voltagefittun.Value';

if app.fittingmethodDropDown.Value=='LMnonlinear'

betaT0=[eg gr gl alpha];

opts = statset('RobustWgtFun','bisquare','MaxIter',1000);

betaT=nlinfit(VT2,IT,'TunnelingR',betaT0,opts);

elseif app.fittingmethodDropDown.Value=='leastsquare'

betaT0=[eg gr gl alpha];

fun=@(betaT0)TunnelingR(betaT0,VT2)-IT;

OP3 = optimoptions(@lsqnonlin,'Algorithm','trust-region-reflective','MaxFunctionEvaluations',1e4,'MaxIterations',1e3);

betaT = lsqnonlin(fun,betaT0,[0,0,0,0],[5,1,1,1],OP3);

end

EgT=betaT(1);

GamaR=betaT(2);

GamaL=betaT(3);

c=betaT(4);

betaT1=[EgT GamaR GamaL c];

app.Vfittun.Value=linspace(app.fittingplotVfromEditField.Value,app.toEditField.Value,501);

app.Ifittun.Value=TunnelingR(betaT1,app.Vfittun.Value);

plot(app.UIAxes6\_3,app.Vfittun.Value,log10(abs(app.Ifittun.Value)),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes6\_3,"on");

plot(app.UIAxes6\_3,app.voltagefittun.Value,log10(abs(app.currentfittun.Value)),'r.','Color','r','LineWidth',3);

xlabel(app.UIAxes6\_3,'Voltage/V','fontsize',18)

ylabel(app.UIAxes6\_3,'log10(I)','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes6\_3,"off");

legend(app.UIAxes6\_3,{'fit','data'},'FontSize',6);

plot(app.UIAxes7\_3,app.Vfittun.Value,app.Ifittun.Value,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes7\_3,"on");

plot(app.UIAxes7\_3,app.voltagefittun.Value,app.currentfittun.Value,'r.','Color','r','LineWidth',3);

xlabel(app.UIAxes7\_3,'Voltage/V','fontsize',18)

ylabel(app.UIAxes7\_3,'log10(I)','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes7\_3,"off");

legend(app.UIAxes7\_3,{'fit','data'},'FontSize',6);

end

function selectfolderButtonPushed(app, event)

selpath=uigetdir('\*.\*','choose a folder');

app.filepathEditField\_2.Value=selpath;

end

function fitButton\_2Pushed(app, event)

app.UIAxes6\_4.cla;

app.UIAxes7\_4.cla;

app.voltagefithop.Value=xlsread(app.filepathEditField\_3.Value,app.sheetEditField\_2.Value,app.voltageEditField\_2.Value);

app.currentfithop.Value=xlsread(app.filepathEditField\_3.Value,app.sheetEditField\_2.Value,app.currentEditField\_2.Value);

eg=app.egEditField\_2.Value;

gr=app.grEditField\_2.Value\*10^13;

gl=app.glEditField\_2.Value\*10^13;

alpha=app.alphaEditField\_2.Value;

lambda=app.lambdaEditField.Value;

IH=app.currentfithop.Value';

VH=app.voltagefithop.Value';

if app.fittingmethodDropDown\_2.Value=='LMnonlinear'

betah0=[eg lambda gr gl alpha];

opts = statset('RobustWgtFun','bisquare','MaxIter',1000);

betah=nlinfit(VH,IH,'HoppingR',betah0,opts);

elseif app.fittingmethodDropDown\_2.Value=='leastsquare'

betaT0=[eg lambda gr gl alpha];

fun=@(betaT0)HoppingR(betaT0,VH)-IH;

OP3 = optimoptions(@lsqnonlin,'Algorithm','trust-region-reflective','MaxFunctionEvaluations',1e4,'MaxIterations',1e3);

betah = lsqnonlin(fun,betaT0,[0,0,0,0,0],[5,5,1,1,1],OP3);

end

EgH=betah(1);

lambdag=betah(2);

gamar=betah(3);

gamal=betah(4);

cg=betah(5);

betah1=[EgH lambdag gamar gamal cg];

app.Vfithop.Value=linspace(app.fittingplotVfromEditField\_2.Value,app.toEditField\_6.Value,501);

app.Ifithop.Value=HoppingR(betah1,app.Vfithop.Value);

plot(app.UIAxes6\_4,app.Vfithop.Value,log10(abs(app.Ifithop.Value)),'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes6\_4,"on");

plot(app.UIAxes6\_4,app.voltagefithop.Value,log10(abs(app.currentfithop.Value)),'r.','Color','r','LineWidth',3);

xlabel(app.UIAxes6\_4,'Voltage/V','fontsize',18)

ylabel(app.UIAxes6\_4,'log10(I)','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes6\_4,"off");

legend(app.UIAxes6\_4,{'fit','data'},'FontSize',6);

plot(app.UIAxes7\_4,app.Vfithop.Value,app.Ifithop.Value,'Color',[11/255 7/255 137/255],'LineWidth',3);

hold(app.UIAxes7\_4,"on");

plot(app.UIAxes7\_4,app.voltagefithop.Value,app.currentfithop.Value,'r.','Color','r','LineWidth',3);

xlabel(app.UIAxes7\_4,'Voltage/V','fontsize',18)

ylabel(app.UIAxes7\_4,'current','fontsize',18)

set(gca,'FontSize',18);

hold(app.UIAxes7\_4,"off");

legend(app.UIAxes7\_4,{'fit','data'},'FontSize',6);

end

function loadfileButton\_2Pushed(app, event)

[filename,pathname]=uigetfile({'\*.xls\*','load data'});

if isequal(filename,0)||isequal(pathname,0)

errordlg("haven't select a file",'error');

return;

end

file=strcat(pathname,filename);

app.filepathEditField\_3.Value=file;

end

function voltagecolumnincapitalEditField\_2ValueChanged(app, event)

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function lineEditField\_3ValueChanged(app, event)

value = app.lineEditField\_3.Value;

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function toEditField\_4ValueChanged(app, event)

value = app.toEditField\_4.Value;

app.voltageEditField\_2.Value=strcat(app.voltagecolumnincapitalEditField\_2.Value,app.lineEditField\_3.Value,":",app.voltagecolumnincapitalEditField\_2.Value,app.toEditField\_4.Value);

end

function currentcolumnincapitalEditField\_2ValueChanged(app, event)

value = app.currentcolumnincapitalEditField\_2.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_5.Value);

end

function lineEditField\_4ValueChanged(app, event)

value = app.lineEditField\_4.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_5.Value);

end

function toEditField\_5ValueChanged(app, event)

value = app.toEditField\_5.Value;

app.currentEditField\_2.Value=strcat(app.currentcolumnincapitalEditField\_2.Value,app.lineEditField\_4.Value,":",app.currentcolumnincapitalEditField\_2.Value,app.toEditField\_5.Value);

end

function selectfolderButton\_2Pushed(app, event)

selpath=uigetdir('\*.\*','choose a folder');

app.filepathEditField\_2.Value=selpath;

end

function saveButtonPushed(app, event)

filename=strcat(app.filepathEditField\_2.Value,'/',app.filenameEditField.Value,'.xlsx');

xlswrite(filename,{'fitVOLTAGE'},1,'A1');

xlswrite(filename,{'fitCURRENT'},1,'B1');

xlswrite(filename,{'datavoltage'},1,'C1');

xlswrite(filename,{'datacurrent'},1,'D1');

xlswrite(filename,app.Vfittun.Value',1,'A2');

xlswrite(filename,app.Ifittun.Value',1,'B2');

xlswrite(filename,app.voltagefittun.Value',1,'C2');

xlswrite(filename,app.currentfittun.Value',1,'D2');

fig = uifigure;

message = {'success save the data!'};

uialert(fig,message,'save file success','Icon','success');

end

function saveButton\_2Pushed(app, event)

filename=strcat(app.filepathEditField\_4.Value,'/',app.filenameEditField\_2.Value,'.xlsx');

xlswrite(filename,{'fitVOLTAGE'},1,'A1');

xlswrite(filename,{'fitCURRENT'},1,'B1');

xlswrite(filename,{'datavoltage'},1,'C1');

xlswrite(filename,{'datacurrent'},1,'D1');

xlswrite(filename,app.Vfittun.Value',1,'A2');

xlswrite(filename,app.Ifittun.Value',1,'B2');

xlswrite(filename,app.voltagefittun.Value',1,'C2');

xlswrite(filename,app.currentfittun.Value',1,'D2');

fig = uifigure;

message = {'success save the data!'};

uialert(fig,message,'save file success','Icon','success');

end

end

methods (Access = private)

function createComponents(app)

app.UIFigure = uifigure('Visible', 'off');

app.UIFigure.Color = [1 1 1];

app.UIFigure.Position = [100 100 1139 747];

app.UIFigure.Name = 'UI Figure';

app.TabGroup2 = uitabgroup(app.UIFigure);

app.TabGroup2.Position = [0 100 1140 648];

app.tunnelingTab = uitab(app.TabGroup2);

app.tunnelingTab.SizeChangedFcn = createCallbackFcn(app, @tunnelingTabSizeChanged, true);

app.tunnelingTab.Title = 'tunneling';

app.tunnelingTab.BackgroundColor = [1 1 1];

app.selectdataPanel = uipanel(app.tunnelingTab);

app.selectdataPanel.Title = 'select data';

app.selectdataPanel.BackgroundColor = [1 1 1];

app.selectdataPanel.Position = [1 502 368 122];

app.loadfileButton = uibutton(app.selectdataPanel, 'push');

app.loadfileButton.ButtonPushedFcn = createCallbackFcn(app, @loadfileButtonPushed, true);

app.loadfileButton.Position = [275 57 78 22];

app.loadfileButton.Text = 'load file';

app.filepathEditFieldLabel = uilabel(app.selectdataPanel);

app.filepathEditFieldLabel.HorizontalAlignment = 'right';

app.filepathEditFieldLabel.Position = [10 57 56 22];

app.filepathEditFieldLabel.Text = 'file path';

app.filepathEditField = uieditfield(app.selectdataPanel, 'text');

app.filepathEditField.Position = [72 57 188 22];

app.filepathEditField.Value = '0';

app.sheetEditFieldLabel = uilabel(app.selectdataPanel);

app.sheetEditFieldLabel.HorizontalAlignment = 'right';

app.sheetEditFieldLabel.Position = [20 18 35 22];

app.sheetEditFieldLabel.Text = 'sheet';

app.sheetEditField = uieditfield(app.selectdataPanel, 'numeric');

app.sheetEditField.Position = [70 18 100 22];

app.sheetEditField.Value = 1;

app.Panel = uipanel(app.tunnelingTab);

app.Panel.BackgroundColor = [1 1 1];

app.Panel.Position = [1 365 366 139];

app.lineEditFieldLabel = uilabel(app.Panel);

app.lineEditFieldLabel.HorizontalAlignment = 'right';

app.lineEditFieldLabel.Position = [213 107 25 22];

app.lineEditFieldLabel.Text = 'line';

app.lineEditField = uieditfield(app.Panel, 'text');

app.lineEditField.ValueChangedFcn = createCallbackFcn(app, @lineEditFieldValueChanged, true);

app.lineEditField.Position = [241 107 40 22];

app.lineEditField.Value = '1';

app.lineEditField\_2Label = uilabel(app.Panel);

app.lineEditField\_2Label.HorizontalAlignment = 'right';

app.lineEditField\_2Label.Position = [213 67 25 22];

app.lineEditField\_2Label.Text = 'line';

app.lineEditField\_2 = uieditfield(app.Panel, 'text');

app.lineEditField\_2.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_2ValueChanged, true);

app.lineEditField\_2.Position = [241 67 40 22];

app.lineEditField\_2.Value = '1';

app.toEditField\_2Label = uilabel(app.Panel);

app.toEditField\_2Label.HorizontalAlignment = 'right';

app.toEditField\_2Label.Position = [272 107 25 22];

app.toEditField\_2Label.Text = 'to';

app.toEditField\_2 = uieditfield(app.Panel, 'text');

app.toEditField\_2.ValueChangedFcn = createCallbackFcn(app, @toEditField\_2ValueChanged, true);

app.toEditField\_2.Position = [311 107 40 22];

app.toEditField\_2.Value = '120';

app.toEditField\_3Label = uilabel(app.Panel);

app.toEditField\_3Label.HorizontalAlignment = 'right';

app.toEditField\_3Label.Position = [272 67 25 22];

app.toEditField\_3Label.Text = 'to';

app.toEditField\_3 = uieditfield(app.Panel, 'text');

app.toEditField\_3.ValueChangedFcn = createCallbackFcn(app, @toEditField\_3ValueChanged, true);

app.toEditField\_3.Position = [311 67 40 22];

app.toEditField\_3.Value = '120';

app.voltagecolumnincapitalEditFieldLabel = uilabel(app.Panel);

app.voltagecolumnincapitalEditFieldLabel.HorizontalAlignment = 'right';

app.voltagecolumnincapitalEditFieldLabel.Position = [18 107 142 22];

app.voltagecolumnincapitalEditFieldLabel.Text = 'voltage column(in capital)';

app.voltagecolumnincapitalEditField = uieditfield(app.Panel, 'text');

app.voltagecolumnincapitalEditField.ValueChangedFcn = createCallbackFcn(app, @voltagecolumnincapitalEditFieldValueChanged, true);

app.voltagecolumnincapitalEditField.Position = [162 107 40 22];

app.voltagecolumnincapitalEditField.Value = 'A';

app.currentcolumnincapitalEditFieldLabel = uilabel(app.Panel);

app.currentcolumnincapitalEditFieldLabel.HorizontalAlignment = 'right';

app.currentcolumnincapitalEditFieldLabel.Position = [19 67 140 22];

app.currentcolumnincapitalEditFieldLabel.Text = 'current column(in capital)';

app.currentcolumnincapitalEditField = uieditfield(app.Panel, 'text');

app.currentcolumnincapitalEditField.ValueChangedFcn = createCallbackFcn(app, @currentcolumnincapitalEditFieldValueChanged, true);

app.currentcolumnincapitalEditField.Position = [162 67 40 22];

app.currentcolumnincapitalEditField.Value = 'B';

app.voltageEditFieldLabel = uilabel(app.Panel);

app.voltageEditFieldLabel.HorizontalAlignment = 'right';

app.voltageEditFieldLabel.Position = [11 37 44 22];

app.voltageEditFieldLabel.Text = 'voltage';

app.voltageEditField = uieditfield(app.Panel, 'text');

app.voltageEditField.Position = [70 37 188 22];

app.voltageEditField.Value = 'A1:A201';

app.currentEditFieldLabel = uilabel(app.Panel);

app.currentEditFieldLabel.HorizontalAlignment = 'right';

app.currentEditFieldLabel.Position = [12 4 43 22];

app.currentEditFieldLabel.Text = 'current';

app.currentEditField = uieditfield(app.Panel, 'text');

app.currentEditField.Position = [70 4 188 22];

app.currentEditField.Value = 'B1:B201';

app.fitButton = uibutton(app.tunnelingTab, 'push');

app.fitButton.ButtonPushedFcn = createCallbackFcn(app, @fitButtonPushed, true);

app.fitButton.Position = [383 369 123 70];

app.fitButton.Text = 'fit';

app.savedataPanel = uipanel(app.tunnelingTab);

app.savedataPanel.Title = 'save data';

app.savedataPanel.BackgroundColor = [1 1 1];

app.savedataPanel.Position = [1 69 459 122];

app.selectfolderButton = uibutton(app.savedataPanel, 'push');

app.selectfolderButton.ButtonPushedFcn = createCallbackFcn(app, @selectfolderButtonPushed, true);

app.selectfolderButton.Position = [317 57 113 22];

app.selectfolderButton.Text = 'select folder';

app.filepathEditField\_2Label = uilabel(app.savedataPanel);

app.filepathEditField\_2Label.HorizontalAlignment = 'right';

app.filepathEditField\_2Label.Position = [10 57 61 22];

app.filepathEditField\_2Label.Text = 'file path';

app.filepathEditField\_2 = uieditfield(app.savedataPanel, 'text');

app.filepathEditField\_2.Position = [94 57 188 22];

app.filepathEditField\_2.Value = '0';

app.filenameEditFieldLabel = uilabel(app.savedataPanel);

app.filenameEditFieldLabel.HorizontalAlignment = 'right';

app.filenameEditFieldLabel.Position = [6 19 65 22];

app.filenameEditFieldLabel.Text = 'filename';

app.filenameEditField = uieditfield(app.savedataPanel, 'text');

app.filenameEditField.Position = [94 19 188 22];

app.filenameEditField.Value = '1';

app.saveButton = uibutton(app.savedataPanel, 'push');

app.saveButton.ButtonPushedFcn = createCallbackFcn(app, @saveButtonPushed, true);

app.saveButton.Position = [317 19 113 22];

app.saveButton.Text = 'save';

app.Panel\_3 = uipanel(app.tunnelingTab);

app.Panel\_3.BorderType = 'none';

app.Panel\_3.Title = 'Panel';

app.Panel\_3.BackgroundColor = [1 1 1];

app.Panel\_3.Position = [1 214 459 139];

app.egEditFieldLabel = uilabel(app.Panel\_3);

app.egEditFieldLabel.HorizontalAlignment = 'right';

app.egEditFieldLabel.Position = [24 89 25 22];

app.egEditFieldLabel.Text = 'eg';

app.egEditField = uieditfield(app.Panel\_3, 'numeric');

app.egEditField.Position = [64 89 100 22];

app.egEditField.Value = 0.8;

app.grEditFieldLabel = uilabel(app.Panel\_3);

app.grEditFieldLabel.HorizontalAlignment = 'right';

app.grEditFieldLabel.Position = [24 49 25 22];

app.grEditFieldLabel.Text = 'gr';

app.grEditField = uieditfield(app.Panel\_3, 'numeric');

app.grEditField.Position = [64 49 100 22];

app.grEditField.Value = 0.01;

app.glEditFieldLabel = uilabel(app.Panel\_3);

app.glEditFieldLabel.HorizontalAlignment = 'right';

app.glEditFieldLabel.Position = [24 19 25 22];

app.glEditFieldLabel.Text = 'gl';

app.glEditField = uieditfield(app.Panel\_3, 'numeric');

app.glEditField.Position = [64 19 100 22];

app.glEditField.Value = 0.04;

app.alphaEditFieldLabel = uilabel(app.Panel\_3);

app.alphaEditFieldLabel.HorizontalAlignment = 'right';

app.alphaEditFieldLabel.Position = [230 19 35 22];

app.alphaEditFieldLabel.Text = 'alpha';

app.alphaEditField = uieditfield(app.Panel\_3, 'numeric');

app.alphaEditField.Position = [280 19 100 22];

app.alphaEditField.Value = 0.6;

app.fittingplotVfromEditFieldLabel = uilabel(app.Panel\_3);

app.fittingplotVfromEditFieldLabel.HorizontalAlignment = 'right';

app.fittingplotVfromEditFieldLabel.Position = [189 88 109 22];

app.fittingplotVfromEditFieldLabel.Text = 'fitting plot V from';

app.fittingplotVfromEditField = uieditfield(app.Panel\_3, 'numeric');

app.fittingplotVfromEditField.Position = [312 88 100 22];

app.fittingplotVfromEditField.Value = -1;

app.toEditFieldLabel = uilabel(app.Panel\_3);

app.toEditFieldLabel.HorizontalAlignment = 'right';

app.toEditFieldLabel.Position = [272 51 25 22];

app.toEditFieldLabel.Text = 'to';

app.toEditField = uieditfield(app.Panel\_3, 'numeric');

app.toEditField.Position = [312 51 100 22];

app.toEditField.Value = 1;

app.UIAxes6\_3 = uiaxes(app.tunnelingTab);

title(app.UIAxes6\_3, 'data')

xlabel(app.UIAxes6\_3, 'voltage')

ylabel(app.UIAxes6\_3, 'current')

app.UIAxes6\_3.FontWeight = 'bold';

app.UIAxes6\_3.TitleFontWeight = 'bold';

app.UIAxes6\_3.BackgroundColor = [1 1 1];

app.UIAxes6\_3.Position = [526 323 613 278];

app.UIAxes7\_3 = uiaxes(app.tunnelingTab);

title(app.UIAxes7\_3, 'data')

xlabel(app.UIAxes7\_3, 'voltage')

ylabel(app.UIAxes7\_3, 'current')

app.UIAxes7\_3.FontWeight = 'bold';

app.UIAxes7\_3.TitleFontWeight = 'bold';

app.UIAxes7\_3.BackgroundColor = [1 1 1];

app.UIAxes7\_3.Position = [526 18 613 278];

app.fittingmethodDropDown\_3Label = uilabel(app.tunnelingTab);

app.fittingmethodDropDown\_3Label.HorizontalAlignment = 'right';

app.fittingmethodDropDown\_3Label.Position = [379 563 89 22];

app.fittingmethodDropDown\_3Label.Text = 'fitting method';

app.fittingmethodDropDown = uidropdown(app.tunnelingTab);

app.fittingmethodDropDown.Items = {'LMnonlinear', 'leastsquare', 'Option 3', 'Option 4'};

app.fittingmethodDropDown.Position = [379 541 140 22];

app.fittingmethodDropDown.Value = 'LMnonlinear';

app.hoppingTab = uitab(app.TabGroup2);

app.hoppingTab.Title = 'hopping';

app.hoppingTab.BackgroundColor = [1 1 1];

app.selectdataPanel\_2 = uipanel(app.hoppingTab);

app.selectdataPanel\_2.Title = 'select data';

app.selectdataPanel\_2.BackgroundColor = [1 1 1];

app.selectdataPanel\_2.Position = [1 502 368 122];

app.loadfileButton\_2 = uibutton(app.selectdataPanel\_2, 'push');

app.loadfileButton\_2.ButtonPushedFcn = createCallbackFcn(app, @loadfileButton\_2Pushed, true);

app.loadfileButton\_2.Position = [275 57 78 22];

app.loadfileButton\_2.Text = 'load file';

app.filepathEditField\_3Label = uilabel(app.selectdataPanel\_2);

app.filepathEditField\_3Label.HorizontalAlignment = 'right';

app.filepathEditField\_3Label.Position = [10 57 56 22];

app.filepathEditField\_3Label.Text = 'file path';

app.filepathEditField\_3 = uieditfield(app.selectdataPanel\_2, 'text');

app.filepathEditField\_3.Position = [72 57 188 22];

app.filepathEditField\_3.Value = '0';

app.sheetEditField\_2Label = uilabel(app.selectdataPanel\_2);

app.sheetEditField\_2Label.HorizontalAlignment = 'right';

app.sheetEditField\_2Label.Position = [20 18 35 22];

app.sheetEditField\_2Label.Text = 'sheet';

app.sheetEditField\_2 = uieditfield(app.selectdataPanel\_2, 'numeric');

app.sheetEditField\_2.Position = [70 18 100 22];

app.sheetEditField\_2.Value = 1;

app.Panel\_4 = uipanel(app.hoppingTab);

app.Panel\_4.BackgroundColor = [1 1 1];

app.Panel\_4.Position = [1 365 366 139];

app.lineEditField\_3Label = uilabel(app.Panel\_4);

app.lineEditField\_3Label.HorizontalAlignment = 'right';

app.lineEditField\_3Label.Position = [213 107 25 22];

app.lineEditField\_3Label.Text = 'line';

app.lineEditField\_3 = uieditfield(app.Panel\_4, 'text');

app.lineEditField\_3.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_3ValueChanged, true);

app.lineEditField\_3.Position = [241 107 40 22];

app.lineEditField\_3.Value = '1';

app.lineEditField\_4Label = uilabel(app.Panel\_4);

app.lineEditField\_4Label.HorizontalAlignment = 'right';

app.lineEditField\_4Label.Position = [213 67 25 22];

app.lineEditField\_4Label.Text = 'line';

app.lineEditField\_4 = uieditfield(app.Panel\_4, 'text');

app.lineEditField\_4.ValueChangedFcn = createCallbackFcn(app, @lineEditField\_4ValueChanged, true);

app.lineEditField\_4.Position = [241 67 40 22];

app.lineEditField\_4.Value = '1';

app.toEditField\_4Label = uilabel(app.Panel\_4);

app.toEditField\_4Label.HorizontalAlignment = 'right';

app.toEditField\_4Label.Position = [272 107 25 22];

app.toEditField\_4Label.Text = 'to';

app.toEditField\_4 = uieditfield(app.Panel\_4, 'text');

app.toEditField\_4.ValueChangedFcn = createCallbackFcn(app, @toEditField\_4ValueChanged, true);

app.toEditField\_4.Position = [311 107 40 22];

app.toEditField\_4.Value = '120';

app.toEditField\_5Label = uilabel(app.Panel\_4);

app.toEditField\_5Label.HorizontalAlignment = 'right';

app.toEditField\_5Label.Position = [272 67 25 22];

app.toEditField\_5Label.Text = 'to';

app.toEditField\_5 = uieditfield(app.Panel\_4, 'text');

app.toEditField\_5.ValueChangedFcn = createCallbackFcn(app, @toEditField\_5ValueChanged, true);

app.toEditField\_5.Position = [311 67 40 22];

app.toEditField\_5.Value = '120';

app.voltagecolumnincapitalEditField\_2Label = uilabel(app.Panel\_4);

app.voltagecolumnincapitalEditField\_2Label.HorizontalAlignment = 'right';

app.voltagecolumnincapitalEditField\_2Label.Position = [18 107 142 22];

app.voltagecolumnincapitalEditField\_2Label.Text = 'voltage column(in capital)';

app.voltagecolumnincapitalEditField\_2 = uieditfield(app.Panel\_4, 'text');

app.voltagecolumnincapitalEditField\_2.ValueChangedFcn = createCallbackFcn(app, @voltagecolumnincapitalEditField\_2ValueChanged, true);

app.voltagecolumnincapitalEditField\_2.Position = [162 107 40 22];

app.voltagecolumnincapitalEditField\_2.Value = 'A';

app.currentcolumnincapitalEditField\_2Label = uilabel(app.Panel\_4);

app.currentcolumnincapitalEditField\_2Label.HorizontalAlignment = 'right';

app.currentcolumnincapitalEditField\_2Label.Position = [19 67 140 22];

app.currentcolumnincapitalEditField\_2Label.Text = 'current column(in capital)';

app.currentcolumnincapitalEditField\_2 = uieditfield(app.Panel\_4, 'text');

app.currentcolumnincapitalEditField\_2.ValueChangedFcn = createCallbackFcn(app, @currentcolumnincapitalEditField\_2ValueChanged, true);

app.currentcolumnincapitalEditField\_2.Position = [162 67 40 22];

app.currentcolumnincapitalEditField\_2.Value = 'B';

app.voltageEditField\_2Label = uilabel(app.Panel\_4);

app.voltageEditField\_2Label.HorizontalAlignment = 'right';

app.voltageEditField\_2Label.Position = [11 37 44 22];

app.voltageEditField\_2Label.Text = 'voltage';

app.voltageEditField\_2 = uieditfield(app.Panel\_4, 'text');

app.voltageEditField\_2.Position = [70 37 188 22];

app.voltageEditField\_2.Value = 'A1:A201';

app.currentEditField\_2Label = uilabel(app.Panel\_4);

app.currentEditField\_2Label.HorizontalAlignment = 'right';

app.currentEditField\_2Label.Position = [12 4 43 22];

app.currentEditField\_2Label.Text = 'current';

app.currentEditField\_2 = uieditfield(app.Panel\_4, 'text');

app.currentEditField\_2.Position = [70 4 188 22];

app.currentEditField\_2.Value = 'B1:B201';

app.fitButton\_2 = uibutton(app.hoppingTab, 'push');

app.fitButton\_2.ButtonPushedFcn = createCallbackFcn(app, @fitButton\_2Pushed, true);

app.fitButton\_2.Position = [383 369 123 70];

app.fitButton\_2.Text = 'fit';

app.savedataPanel\_2 = uipanel(app.hoppingTab);

app.savedataPanel\_2.BorderType = 'none';

app.savedataPanel\_2.Title = 'save data';

app.savedataPanel\_2.BackgroundColor = [1 1 1];

app.savedataPanel\_2.Position = [1 69 459 122];

app.selectfolderButton\_2 = uibutton(app.savedataPanel\_2, 'push');

app.selectfolderButton\_2.ButtonPushedFcn = createCallbackFcn(app, @selectfolderButton\_2Pushed, true);

app.selectfolderButton\_2.Position = [317 58 113 22];

app.selectfolderButton\_2.Text = 'select folder';

app.filepathEditField\_4Label = uilabel(app.savedataPanel\_2);

app.filepathEditField\_4Label.HorizontalAlignment = 'right';

app.filepathEditField\_4Label.Position = [10 58 61 22];

app.filepathEditField\_4Label.Text = 'file path';

app.filepathEditField\_4 = uieditfield(app.savedataPanel\_2, 'text');

app.filepathEditField\_4.Position = [94 58 188 22];

app.filepathEditField\_4.Value = '0';

app.filenameEditField\_2Label = uilabel(app.savedataPanel\_2);

app.filenameEditField\_2Label.HorizontalAlignment = 'right';

app.filenameEditField\_2Label.Position = [6 20 65 22];

app.filenameEditField\_2Label.Text = 'filename';

app.filenameEditField\_2 = uieditfield(app.savedataPanel\_2, 'text');

app.filenameEditField\_2.Position = [94 20 188 22];

app.filenameEditField\_2.Value = '1';

app.saveButton\_2 = uibutton(app.savedataPanel\_2, 'push');

app.saveButton\_2.ButtonPushedFcn = createCallbackFcn(app, @saveButton\_2Pushed, true);

app.saveButton\_2.Position = [317 20 113 22];

app.saveButton\_2.Text = 'save';

app.Panel\_5 = uipanel(app.hoppingTab);

app.Panel\_5.BorderType = 'none';

app.Panel\_5.Title = 'Panel';

app.Panel\_5.BackgroundColor = [1 1 1];

app.Panel\_5.Position = [2 190 459 163];

app.egEditField\_2Label = uilabel(app.Panel\_5);

app.egEditField\_2Label.HorizontalAlignment = 'right';

app.egEditField\_2Label.Position = [27 113 25 22];

app.egEditField\_2Label.Text = 'eg';

app.egEditField\_2 = uieditfield(app.Panel\_5, 'numeric');

app.egEditField\_2.Position = [67 113 100 22];

app.egEditField\_2.Value = 0.8;

app.grEditField\_2Label = uilabel(app.Panel\_5);

app.grEditField\_2Label.HorizontalAlignment = 'right';

app.grEditField\_2Label.Position = [27 75 25 22];

app.grEditField\_2Label.Text = 'gr';

app.grEditField\_2 = uieditfield(app.Panel\_5, 'numeric');

app.grEditField\_2.Position = [67 75 53 22];

app.grEditField\_2.Value = 1;

app.glEditField\_2Label = uilabel(app.Panel\_5);

app.glEditField\_2Label.HorizontalAlignment = 'right';

app.glEditField\_2Label.Position = [27 43 25 22];

app.glEditField\_2Label.Text = 'gl';

app.glEditField\_2 = uieditfield(app.Panel\_5, 'numeric');

app.glEditField\_2.Position = [67 43 53 22];

app.glEditField\_2.Value = 1;

app.alphaEditField\_2Label = uilabel(app.Panel\_5);

app.alphaEditField\_2Label.HorizontalAlignment = 'right';

app.alphaEditField\_2Label.Position = [230 43 35 22];

app.alphaEditField\_2Label.Text = 'alpha';

app.alphaEditField\_2 = uieditfield(app.Panel\_5, 'numeric');

app.alphaEditField\_2.Position = [280 43 100 22];

app.alphaEditField\_2.Value = 0.6;

app.fittingplotVfromEditField\_2Label = uilabel(app.Panel\_5);

app.fittingplotVfromEditField\_2Label.HorizontalAlignment = 'right';

app.fittingplotVfromEditField\_2Label.Position = [189 112 109 22];

app.fittingplotVfromEditField\_2Label.Text = 'fitting plot V from';

app.fittingplotVfromEditField\_2 = uieditfield(app.Panel\_5, 'numeric');

app.fittingplotVfromEditField\_2.Position = [312 112 100 22];

app.fittingplotVfromEditField\_2.Value = -1;

app.toEditField\_6Label = uilabel(app.Panel\_5);

app.toEditField\_6Label.HorizontalAlignment = 'right';

app.toEditField\_6Label.Position = [272 75 25 22];

app.toEditField\_6Label.Text = 'to';

app.toEditField\_6 = uieditfield(app.Panel\_5, 'numeric');

app.toEditField\_6.Position = [312 75 100 22];

app.toEditField\_6.Value = 1;

app.lambdaEditFieldLabel = uilabel(app.Panel\_5);

app.lambdaEditFieldLabel.HorizontalAlignment = 'right';

app.lambdaEditFieldLabel.Position = [1 13 51 22];

app.lambdaEditFieldLabel.Text = 'lambda';

app.lambdaEditField = uieditfield(app.Panel\_5, 'numeric');

app.lambdaEditField.Position = [67 13 100 22];

app.lambdaEditField.Value = 0.6;

app.grEditField\_2Label\_2 = uilabel(app.Panel\_5);

app.grEditField\_2Label\_2.HorizontalAlignment = 'right';

app.grEditField\_2Label\_2.Position = [116 75 48 22];

app.grEditField\_2Label\_2.Text = '\*10^13';

app.grEditField\_2Label\_3 = uilabel(app.Panel\_5);

app.grEditField\_2Label\_3.HorizontalAlignment = 'right';

app.grEditField\_2Label\_3.Position = [119 43 48 22];

app.grEditField\_2Label\_3.Text = '\*10^13';

app.UIAxes6\_4 = uiaxes(app.hoppingTab);

title(app.UIAxes6\_4, 'data')

xlabel(app.UIAxes6\_4, 'voltage')

ylabel(app.UIAxes6\_4, 'current')

app.UIAxes6\_4.FontWeight = 'bold';

app.UIAxes6\_4.TitleFontWeight = 'bold';

app.UIAxes6\_4.BackgroundColor = [1 1 1];

app.UIAxes6\_4.Position = [526 323 613 278];

app.UIAxes7\_4 = uiaxes(app.hoppingTab);

title(app.UIAxes7\_4, 'data')

xlabel(app.UIAxes7\_4, 'voltage')

ylabel(app.UIAxes7\_4, 'current')

app.UIAxes7\_4.FontWeight = 'bold';

app.UIAxes7\_4.TitleFontWeight = 'bold';

app.UIAxes7\_4.BackgroundColor = [1 1 1];

app.UIAxes7\_4.Position = [526 18 613 278];

app.fittingmethodDropDown\_3Label\_2 = uilabel(app.hoppingTab);

app.fittingmethodDropDown\_3Label\_2.HorizontalAlignment = 'right';

app.fittingmethodDropDown\_3Label\_2.Position = [375 564 89 22];

app.fittingmethodDropDown\_3Label\_2.Text = 'fitting method';

app.fittingmethodDropDown\_2 = uidropdown(app.hoppingTab);

app.fittingmethodDropDown\_2.Items = {'LMnonlinear', 'leastsquare', 'Option 3', 'Option 4'};

app.fittingmethodDropDown\_2.Position = [375 542 140 22];

app.fittingmethodDropDown\_2.Value = 'LMnonlinear';

app.homeButton = uibutton(app.UIFigure, 'push');

app.homeButton.BackgroundColor = [1 1 1];

app.homeButton.FontSize = 20;

app.homeButton.FontWeight = 'bold';

app.homeButton.Position = [947 1 71 36];

app.homeButton.Text = 'home';

app.Image3 = uiimage(app.UIFigure);

app.Image3.Position = [1 1 535 100];

app.Image3.ImageSource = 'logo\_1.png';

app.Image5 = uiimage(app.UIFigure);

app.Image5.ImageClickedFcn = createCallbackFcn(app, @Image5Clicked, true);

app.Image5.Position = [961 44 43 41];

app.Image5.ImageSource = 'OIP-C.jpg';

app.UIFigure.Visible = 'on';

end

end

methods (Access = public)

function app = fitting

createComponents(app)

registerApp(app, app.UIFigure)

if nargout == 0

clear app

end

end

function delete(app)

delete(app.UIFigure)

end

end

end