Solutions for ME6130 - Lab Tutorial

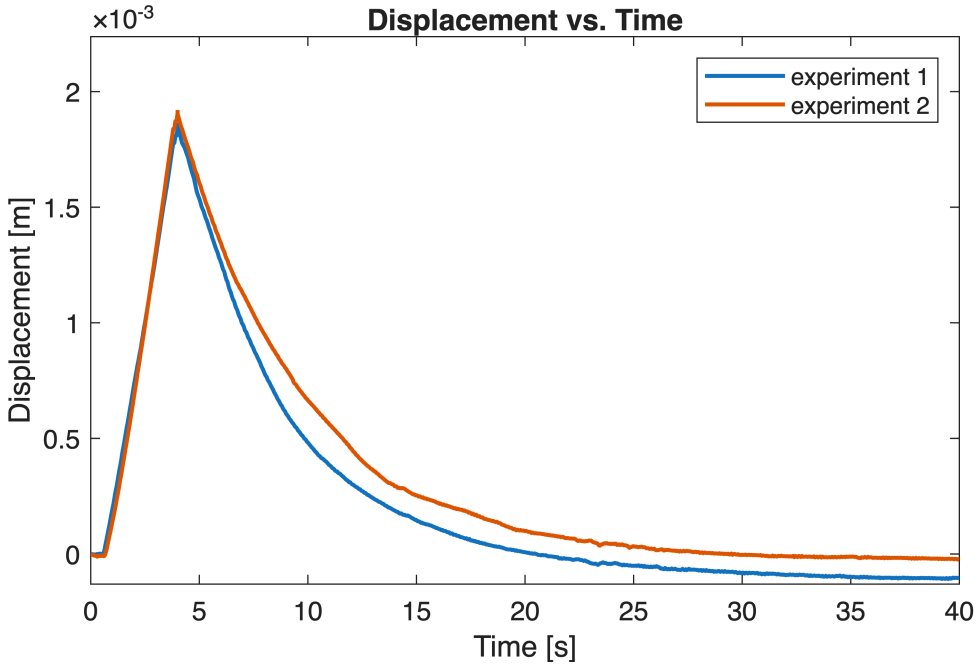
The Carbon Fiber (CF) TCAM modelling and Simulation work

```
clear all; close all;
MaterialType = 'CF';     % or 'Nylon'
loadTCAMParameters(MaterialType);
```

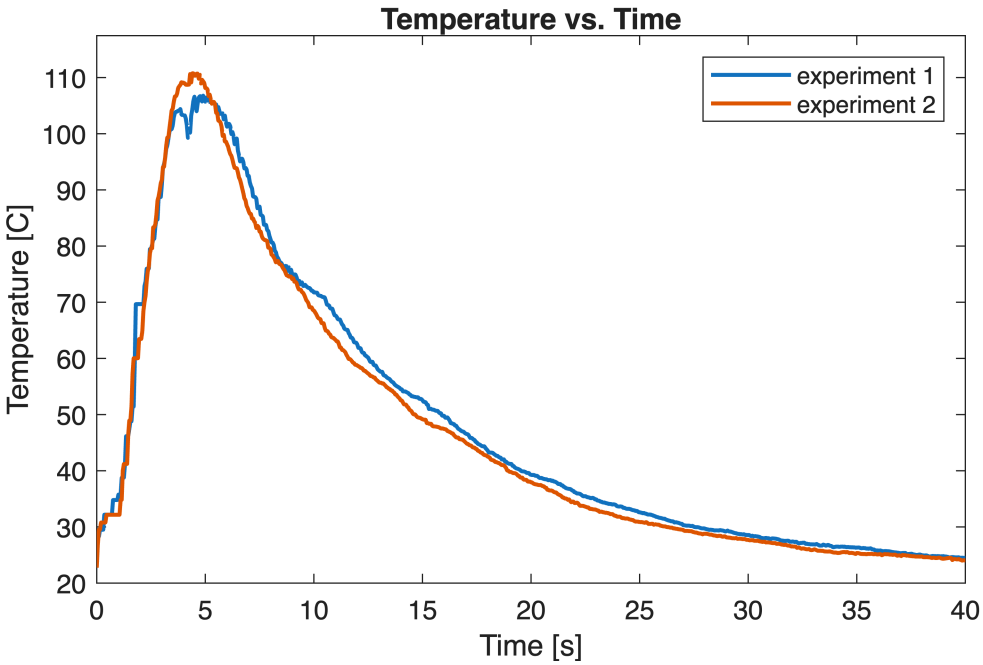
```
✔ Parameters loaded for CF
```

Plot the CF experimental results

```
fig1 = figure(1);
plot(Time,Disp,'-',LineWidth=1.5)
legend('experiment 1','experiment 2')
xlabel('Time [s]')
ylabel('Displacement [m]')
ylim([min(Disp(:,1))*1.2 max(Disp(:,1))*1.2])
title('Displacement vs. Time')
```




```
fig2 = figure(2);
plot(Time,Temp,'-',LineWidth=1.5)
legend('experiment 1','experiment 2')
xlabel('Time [s]')
ylabel('Temperature [C]')
ylim([20 max(Temp(:,1))*1.1])
title('Temperature vs. Time')
```



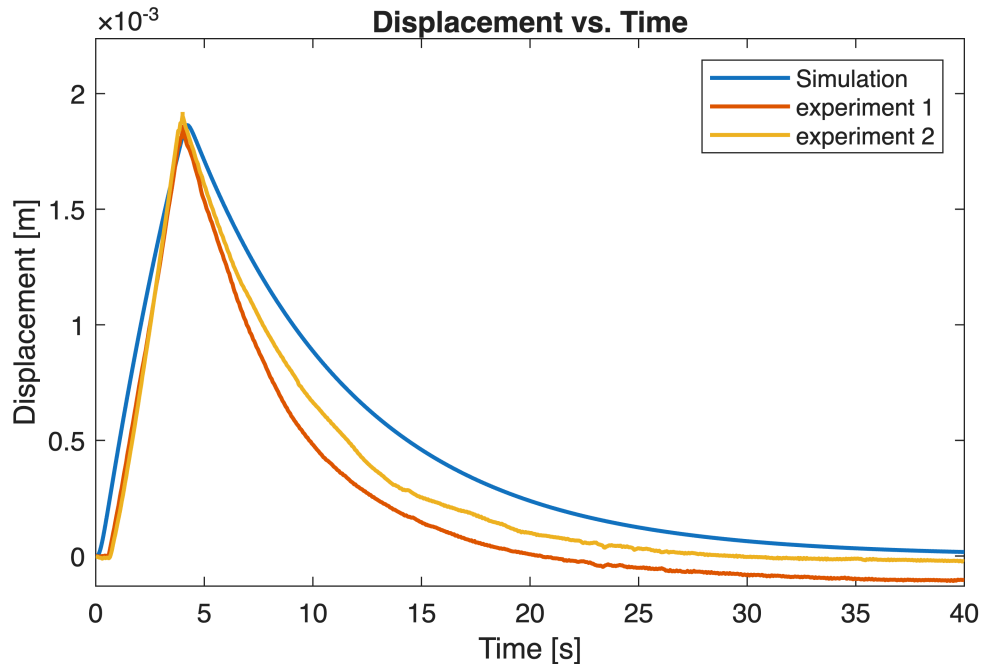
Generate the Simulated plots for CF

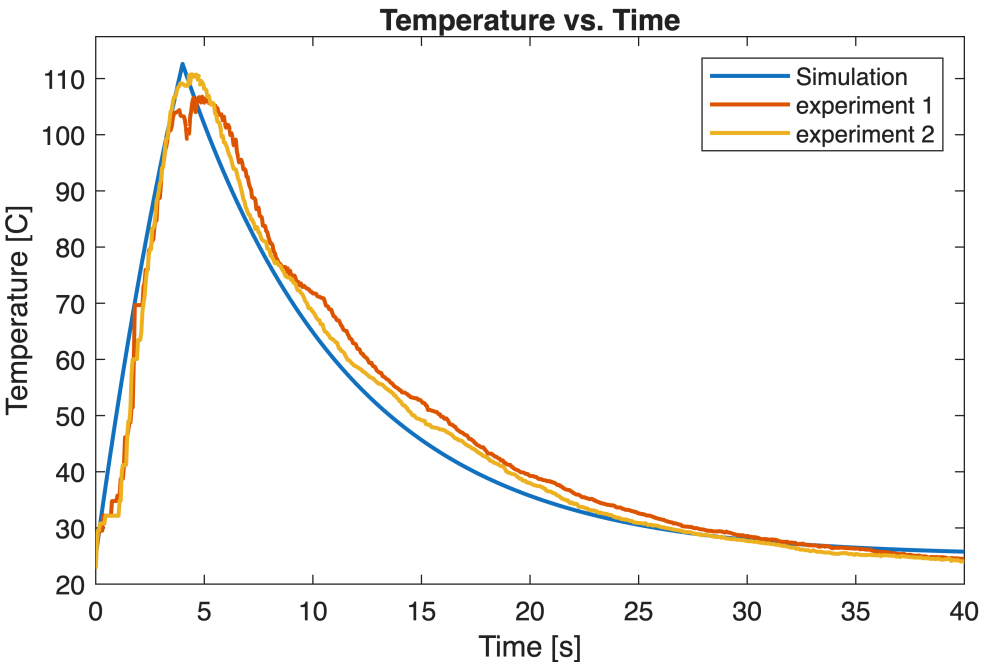
```
out = sim('Sim_model_LS.slx')
```

```
out =
  Simulink.SimulationOutput:

                 simout: [1x1 timeseries]
                   tout: [801x1 double]

      SimulationMetadata: [1x1 Simulink.SimulationMetadata]
            ErrorMessage: [0x0 char]
```

Plot both simulated and experimental results on the same plot for CF

```
plotTCAMResults();
```





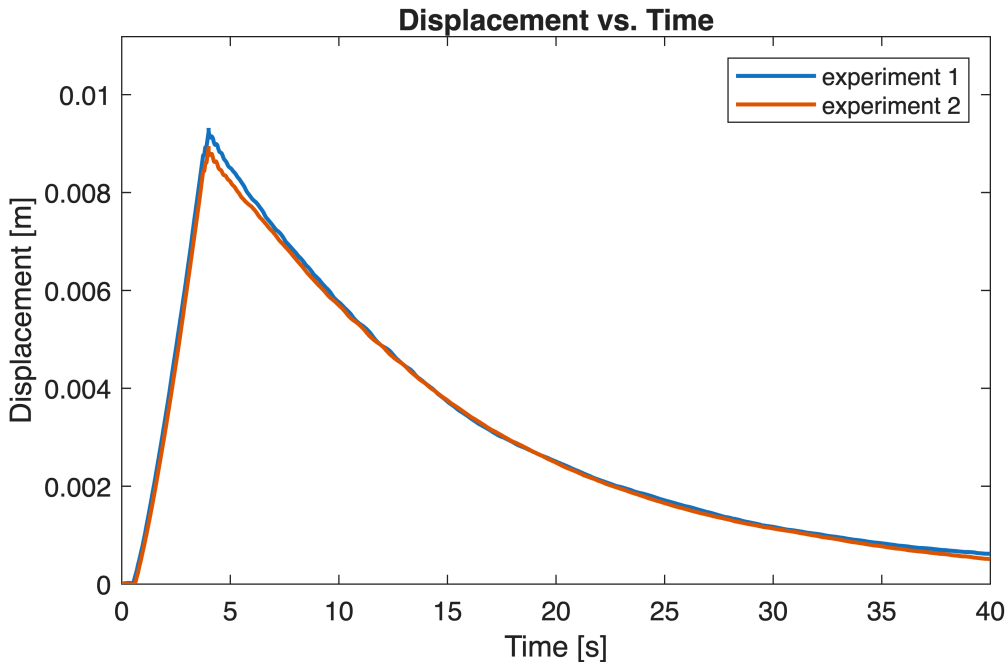
The Nylon TCAM modelling and Simulation work

```
clear all;
MaterialType = 'Nylon';
loadTCAMParameters(MaterialType);
```

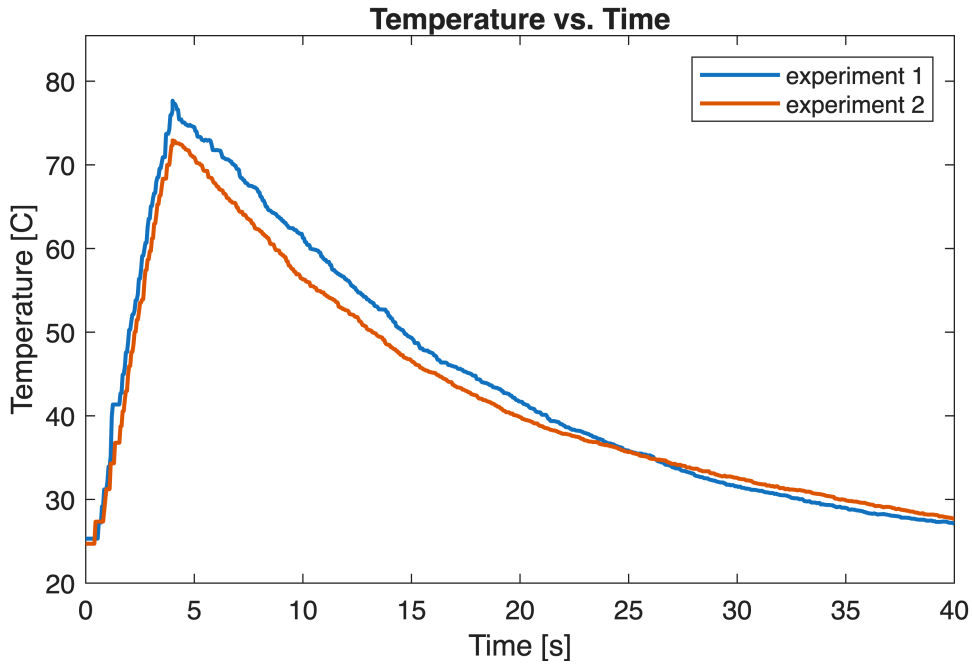
```
✔ Parameters loaded for Nylon
```

Plot the Nylon experimental results

```
fig1 = figure(1);
plot(Time,Disp,'-',LineWidth=1.5)
legend('experiment 1','experiment 2')
xlabel('Time [s]')
ylabel('Displacement [m]')
ylim([min(Disp(:,1))*1.2 max(Disp(:,1))*1.2])
title('Displacement vs. Time')
```




```
fig2 = figure(2);
plot(Time,Temp,'-',LineWidth=1.5)
legend('experiment 1','experiment 2')
xlabel('Time [s]')
ylabel('Temperature [C]')
ylim([20 max(Temp(:,1))*1.1])
title('Temperature vs. Time')
```



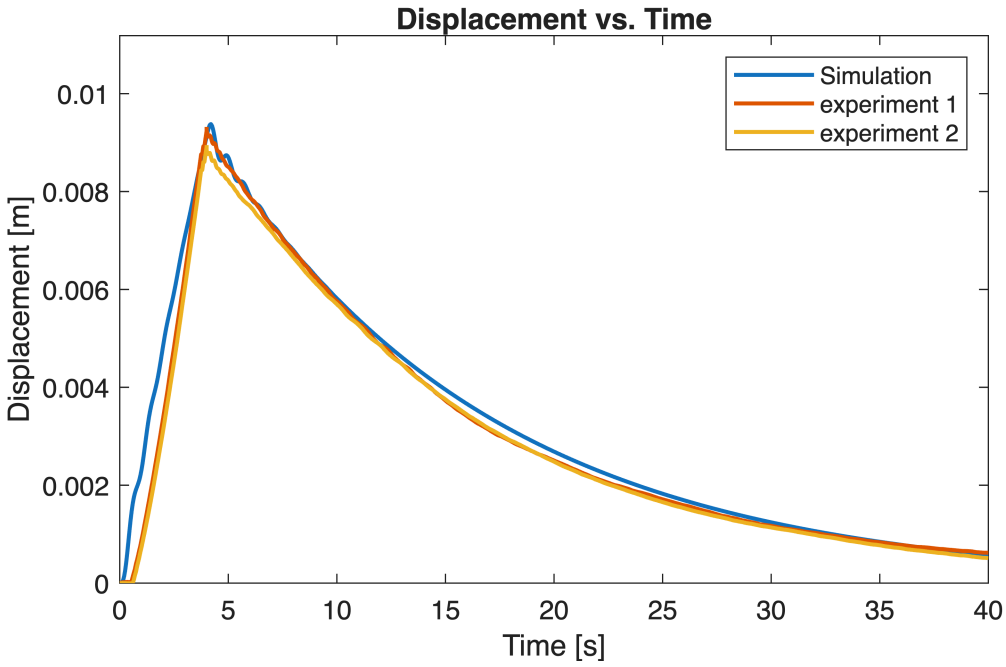
Generate the Simulated plots for Nylon

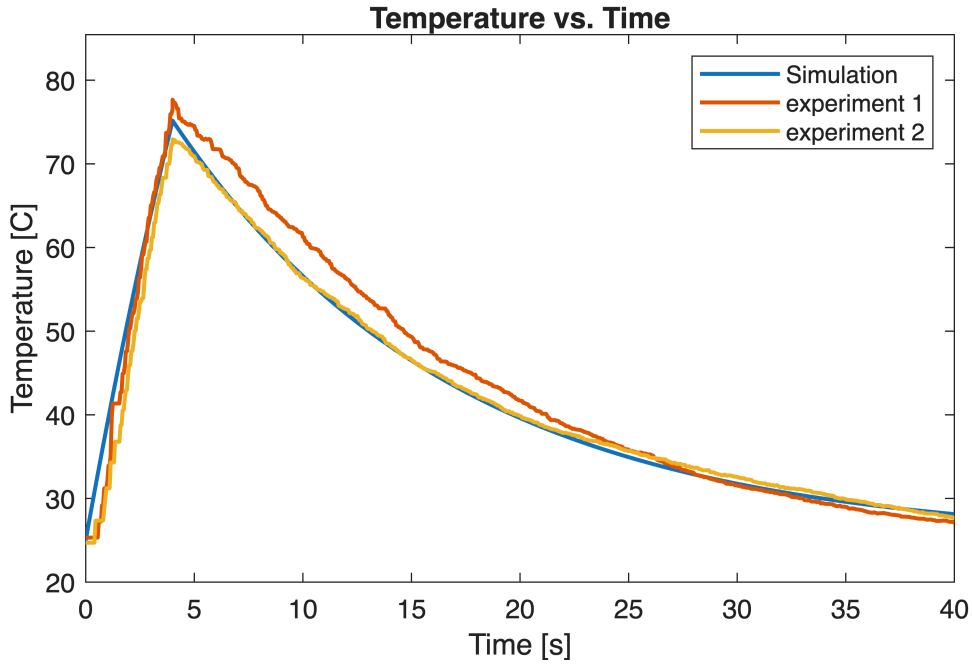
```
out = sim('Sim_model_LS.slx')
```

```
out =
  Simulink.SimulationOutput:

                 simout: [1x1 timeseries]
                   tout: [801x1 double]

      SimulationMetadata: [1x1 Simulink.SimulationMetadata]
            ErrorMessage: [0x0 char]
```

Plot both simulated and experimental results on the same plot for Nylon

```
plotTCAMResults();
```


Displacement vs. Time
Simulation
experiment 1
experiment 2
Displacement [m]
0.01
0.008
0.006
0.004
0.002
0
0
5
10
15
20
25
30
35
40
Time [s]


Temperature vs. Time
Simulation
experiment 1
experiment 2
Temperature [C]
80
70
60
50
40
30
20
0
5
10
15
20
25
30
35
40
Time [s]