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```
function M4Alg_014_05

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
% ENGR 132 Program Description
% This executive function calculates mean and std Tau for 5 different
%
%
% Function Call
%  M4Alg_014_05
%
% Input Arguments
% none
%
% Output Arguments
% none
%
% Assignment Information
% Assignment:         Final Project
%   Team ID:            014-05
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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%%%%%%
```

INITIALIZATION ---

```
coolClean = csvread('M2_Data_COOLING_CleanCalibration.csv');
coolNoise = csvread('M2_Data_COOLING_NoisyCalibration.csv');
heatClean = csvread('M2_Data_HEATING_CleanCalibration.csv');
heatNoise = csvread('M2_Data_HEATING_NoisyCalibration.csv');



data = csvread('fos_time_histories.csv');
```

```
time = data(:,1); %Time data

rangeData = 21;  %Specifies which current model of thermocouple
 program is analyzing
oldRangeData = 1; %Specifies which past range was anaylzed
aggregateTau = 0; %5x20 matrix of tau values
aggregateSSE = 0; %5x20 matrix of sse values
```

CALCULATIONS ---

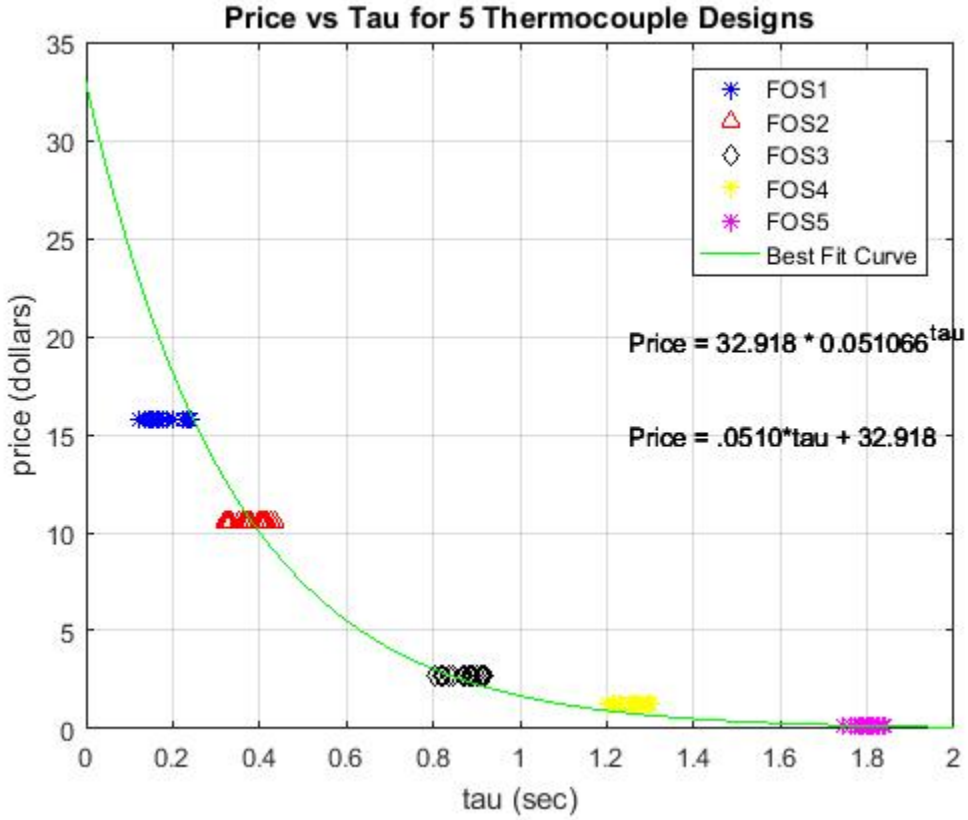
```
%Written by Alex Pieprzycki
i = 2;
j = 1;
while(j <= 5) %Loops 5 times for the prototypes
 while(i <= rangeData) %i keeps incrementing by one, rangeData
 incements by 20 after inner loop to increase to correct range
  %[minimum, maximum, timeStep, tau, isHeating] =
 M2Alg1_014_05(data(:,i), time);
  [minimum, maximum, timeStep, tau, isHeating] = M4Alg2_014_05([time,
 data(:,i)]);
  aggregateSSE(j,i-oldRangeData) = M4Calibration_014_05(minimum,
 maximum, timeStep, tau, data(:,i), time, isHeating);
  aggregateTau(j,i-oldRangeData) = tau;
  i = i+1;
 end
 oldRangeData = rangeData;
 rangeData = rangeData + 20;
 j = j + 1;
end

%Calculates means,std, and see stats for all models of thermocouple
meanFS1 = mean(aggregateTau(1,:));
stdFS1 = std(aggregateTau(1,:));
sseFS1 = mean(aggregateSSE(1,:));
meanFS2 = mean(aggregateTau(2,:));
stdFS2 = std(aggregateTau(2,:));
sseFS2 = mean(aggregateSSE(2,:));
meanFS3 = mean(aggregateTau(3,:));
stdFS3 = std(aggregateTau(3,:));
sseFS3 = mean(aggregateSSE(3,:));
meanFS4 = mean(aggregateTau(4,:));
stdFS4 = std(aggregateTau(4,:));
sseFS4 = mean(aggregateSSE(4,:));
meanFS5 = mean(aggregateTau(5,:));
stdFS5 = std(aggregateTau(5,:));
sseFS5 = mean(aggregateSSE(5,:));
```

COMMAND WINDOW OUTPUTS ---

```
fprintf('\t\t\tYl\t\tYh\t\tTs\t\tTau\t\tSSE\n');
[minimum, maximum, timeStep, tau, isHeating] =
 M4Alg2_014_05(coolClean);
sse = M4Calibration_014_05(minimum, maximum, timeStep, tau,
 coolClean(:,2), coolClean(:,1), isHeating);
fprintf('Cool Clean\t%.2f\t%.2f\t%.4f\t%.4f\t%.4f
\n',minimum,maximum,timeStep,tau,sse);
[minimum, maximum, timeStep, tau, isHeating] =
 M4Alg2_014_05(coolNoise);
sse = M4Calibration_014_05(minimum, maximum, timeStep, tau,
 coolNoise(:,2), coolNoise(:,1), isHeating);
fprintf('Cool Noise\t%.2f\t%.2f\t%.4f\t%.4f\t%.4f
\n',minimum,maximum,timeStep,tau,sse);
[minimum, maximum, timeStep, tau, isHeating] =
 M4Alg2_014_05(heatClean);
sse = M4Calibration_014_05(minimum, maximum, timeStep, tau,
 heatClean(:,2), heatClean(:,1), isHeating);
fprintf('Heat Clean\t%.2f\t%.2f\t%.4f\t%.4f\t%.4f
\n',minimum,maximum,timeStep,tau,sse);
[minimum, maximum, timeStep, tau, isHeating] =
 M4Alg2_014_05(heatNoise);
sse = M4Calibration_014_05(minimum, maximum, timeStep, tau,
 heatNoise(:,2), heatNoise(:,1), isHeating);
fprintf('Heat Noise\t%.2f\t%.2f\t%.4f\t%.4f\t%.4f\n
\n',minimum,maximum,timeStep,tau,sse);

fprintf('\tMean\tStd\t\tMean SSE\n');
fprintf('FS1 %.4f\t%.4f\t%.4f\nFS2 %.4f\t%.4f\t%.4f\nFS3
 %.4f\t%.4f\t%.4f\nFS4 %.4f\t%.4f\t%.4f\nFS5 %.4f\t%.4f\t%.4f
\n',meanFS1,stdFS1,sseFS1,meanFS2,stdFS2,sseFS2,meanFS3,stdFS3,sseFS3,meanFS4,stdF

[SSE,SST,r2,m,b] = M4Regr_014_05(aggregateTau); %Calls the Regression
 function to plot a regression curve
fprintf('\nRegression line stats: \n');
fprintf('SSE: %.6f\nSST: %.6f\nr2: %.6f\nm: %.6f\nb: %.6f
\n',SSE,SST,r2,m,b);
```

```
   Yl  Yh  Ts  Tau  SSE
Cool Clean -0.93 100.06 1.0264 1.8673 0.2174
Cool Noise -0.91 97.23 1.9150 1.0283 3.2352
Heat Clean 0.25 99.38 1.3438 0.2356 0.6432
Heat Noise -1.51 98.04 1.8369 1.3600 2.1010

 Mean Std  Mean SSE
FS1 0.1835 0.0387 2.2349
FS2 0.3822 0.0375 1.3596
FS3 0.8672 0.0387 1.0509
FS4 1.2591 0.0312 1.0238
```

```
FS5 1.7996 0.0288 1.2160

Regression line stats:
SSE: 0.934868
SST: 34.530725
r2: 0.972926
m: 0.051066
b: 32.918458
```



ACADEMIC INTEGRITY STATEMENT ---

I/We have not used source code obtained from any other unauthorized source, either modified or unmodified. Neither have I/we provided access to my/our code to another. The project I/we am/are submitting is my/our own original work.

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