MATLAB HOMEWORK 2

Jordan Lian

GE 1502 -- 308 Hurtig Hall

10:30 - 11:35am

Professor Whalen

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Thermal efficiency of a straight rectangular finned surface

m-file

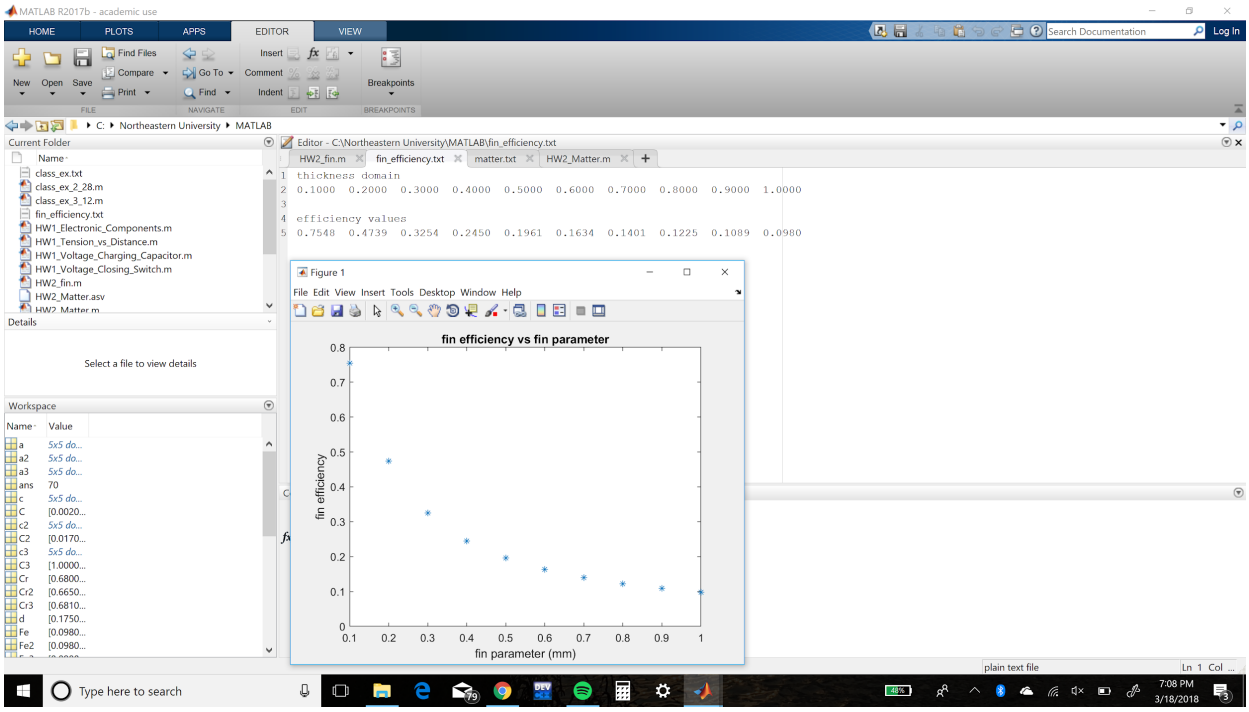
```
%tension vs distance
L = 10; %10 mm
t = 0.1; %0.1 mm
Lc = L + (2*t); %constant function
i = 1; %counter loop initializing variable

for n=0.1 : 0.1 : 1 %for loop for incrementation
    nfin(i) = tanh(n*Lc) / (n*Lc) ; %function
    m(i)=n; %make m a vector
    i = i+1;
end

%results
FID = fopen('fin_efficiency.txt', 'w'); %file pointer, permission write
fprintf(FID, 'thickness domain\n'); %header
fprintf(FID, '%4.4f\t', m); %values, and repeat process
fprintf(FID, '\n\nefficiency values\n');
fprintf(FID, '%4.4f\t', nfin);

%plot
plot(m, nfin, '*'); %plot function with points only
xlabel('fin parameter (mm)');
ylabel('fin efficiency');
title('fin efficiency vs fin parameter');
```

plot window and txt file results



Law of the Conservation of Matter

m-file

```
%composition of parts

Cr = [0.68, 0.75 , 0, 0, 0];
Ni = [0.2, 0, 0.998, 0, 0];
Mn = [0.02, 0.001, 0.001, 0.001, 0];
C = [0.002, 0.02, 0, 0.001, 0.999];
Fe = [.098, 0.229, 0.001, 0.998, 0.001];

%a, d

a = [Cr; Ni; Mn; C; Fe]; %from equations
d = [0.175, 0.085, 0.005, 0.002, 0.733]'; %from equations
c = inv(a); %[a]^-1

%exercise 1

%solution, multiply by 100 to convert the percentages
j1a = (a\d*100);
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```
j1b = (100* c*d);

%print results
FID = fopen('matter.txt', 'w'); %create file pointer with permission write
fprintf(FID, 'Exercise 1\nMatrix [A]\n'); %create header
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', a); %4 decmial places
fprintf(FID, '\nInverse Matrix [A]^-1\n'); %repeat process, and so on...
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', c);
fprintf(FID, '\nSolution using [A] \\ [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j1a);
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j1b);

%exercise 2 -- label variables correspondingly

Cr2 = [0.665, 0.74 , 0, 0, 0];
Ni2 = [0.2, 0, 0.998, 0, 0];
Mn2 = [0.02, 0.001, 0.001, 0.001, 0];
C2 = [0.017, 0.03, 0, 0.001, 0.999];
Fe2 = [.098, 0.229, 0.001, 0.998, 0.001];

a2 = [Cr2; Ni2; Mn2; C2; Fe2];
c2 = inv(a2);

%solution
j2a = (a2\d*100);
j2b = (100*c2*d);

fprintf(FID, '\nExercise 2\nMatrix [A]\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', a2);
fprintf(FID, '\nInverse Matrix [A]^-1\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', c2);
fprintf(FID, '\nSolution using [A] \\ [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j2a);
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j2b);

%exercise 3

Cr3 = [0.681, 0.745 , 0, 0, 0];
Ni3 = [0.2, 0, 0.998, 0, 0];
Mn3 = [0.02, 0.001, 0.001, 0.001, 0];
C3 = [0.001, 0.025, 0, 0.001, 0.999];
```

```
Fe3 = [.098, 0.229, 0.001, 0.998, 0.001];

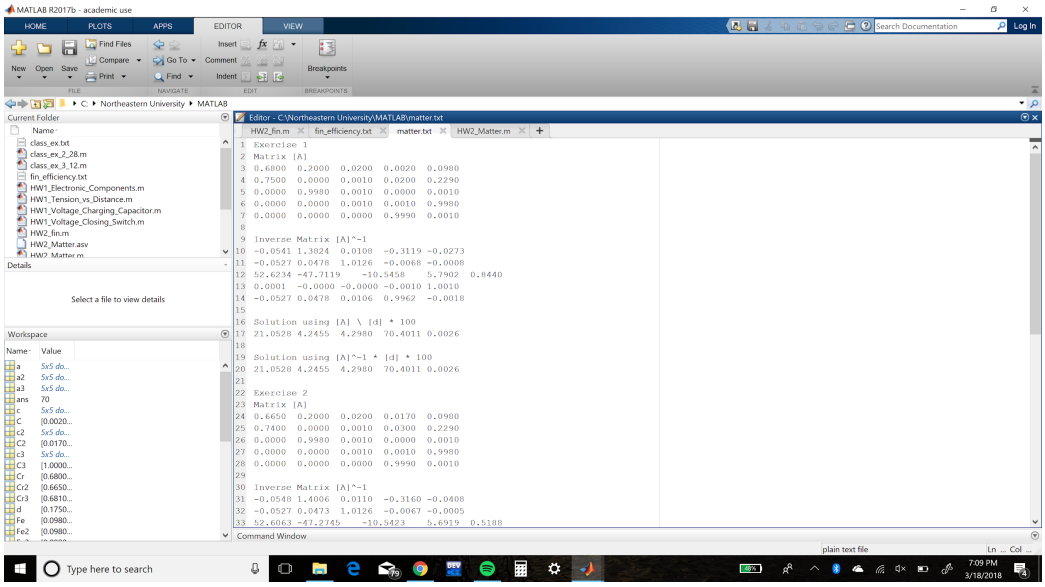
a3 = [Cr3; Ni3; Mn3; C3; Fe3];
c3 = inv(a3);

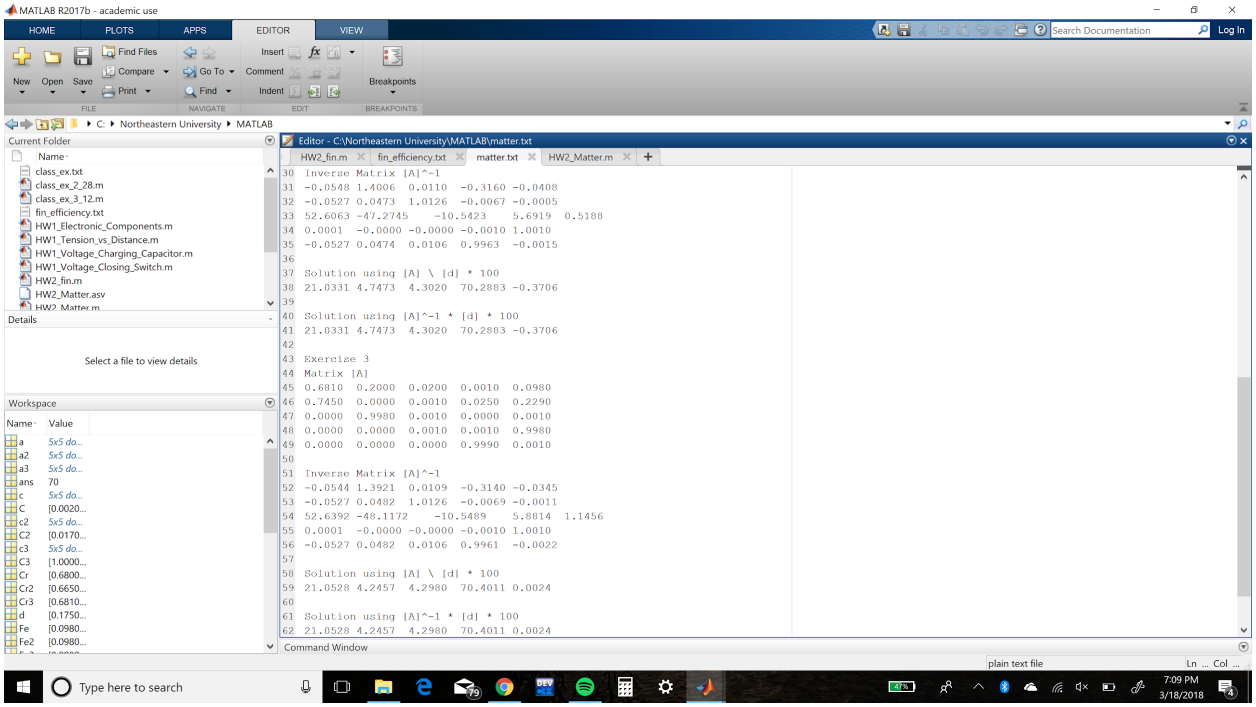
j3a = (a3\d*100);
j3b = (100*c3*d);

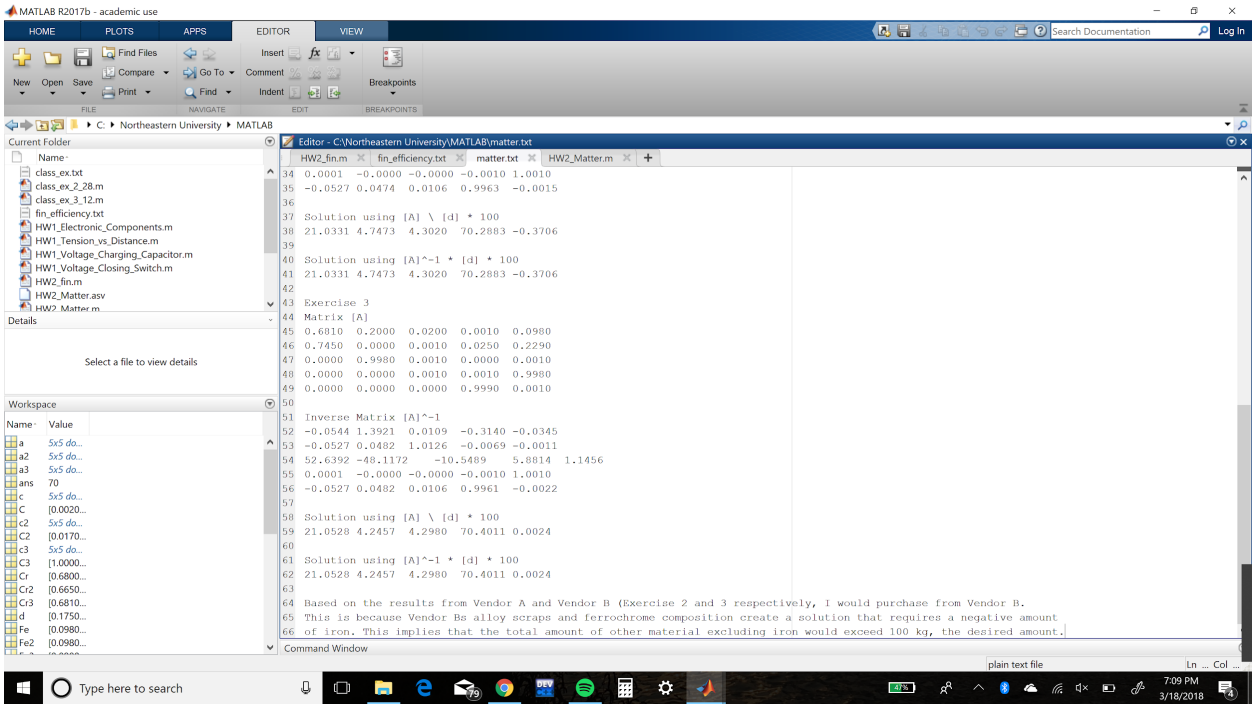
fprintf(FID, '\nExercise 3\nMatrix [A]\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', a3);
fprintf(FID, '\nInverse Matrix [A]^-1\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', c3);
fprintf(FID, '\nSolution using [A] \\ [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j3a);
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
fprintf(FID, '%4.4f\t%4.4f\t%4.4f\t%4.4f\t%4.4f\n', j3b);

%results and my conclusion
fprintf(FID, '\nBased on the results from Vendor A and Vendor B (Exercise 2 and 3 respectively, I
would purchase from Vendor B.');
fprintf(FID, '\nThis is because Vendor Bs alloy scraps and ferrochrome composition create a
solution that requires a negative amount');
fprintf(FID, '\nof iron. This implies that the total amount of other material excluding iron would
exceed 100 kg, the desired amount.');
```

txt.file results







Business-Style Letter

(see attached file)