

# 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

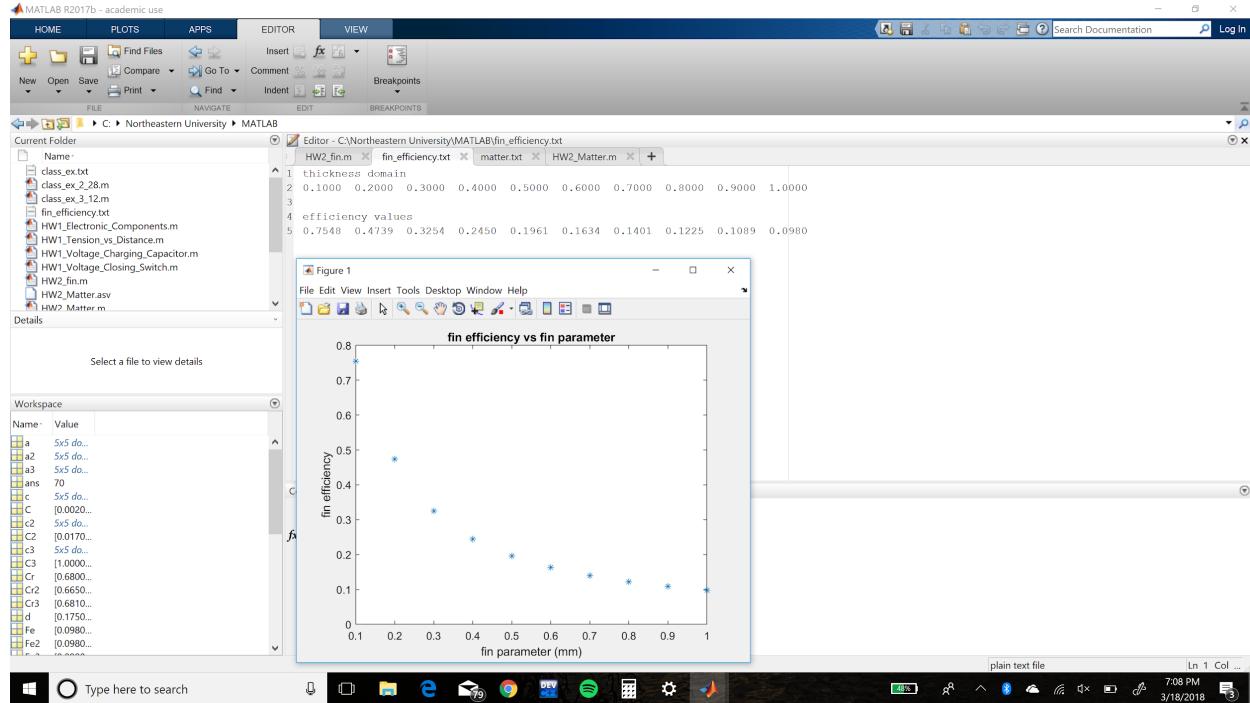
```
%tension vs distance
L = 10; %10 mm
t = 0.1; %0.1 mm
Lc = L + (2*t); %constant function
i = 1; %counter loop initializing variable

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');
fprintf(FID, '%4.4f\n', m); %values, and repeat process
fprintf(FID, '\n\nefficiency values\n');
fprintf(FID, '%4.4f\n', 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

$\text{Cr} = [0.68, 0.75, 0, 0, 0];$

$\text{Ni} = [0.2, 0, 0.998, 0, 0];$

$\text{Mn} = [0.02, 0.001, 0.001, 0.001, 0];$

$\text{C} = [0.002, 0.02, 0, 0.001, 0.999];$

$\text{Fe} = [.098, 0.229, 0.001, 0.998, 0.001];$

%a, d

$\text{a} = [\text{Cr}; \text{Ni}; \text{Mn}; \text{C}; \text{Fe}];$  %from equations

$\text{d} = [0.175, 0.085, 0.005, 0.002, 0.733]'$ ; %from equations

$\text{c} = \text{inv}(\text{a});$  % $[\text{a}]^{-1}$

%exercise 1

%solution, multiply by 100 to convert the percentages

$\text{j1a} = (\text{a}\backslash\text{d} * 100);$

```

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%4.4f%4.4f%4.4f\n', a); %4 decimal places
fprintf(FID, '\nInverse Matrix [A]^-1\n'); %repeat process, and so on...
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f\n', c);
fprintf(FID, '\nSolution using [A] \\ $\backslash$  [d] * 100\n');
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f\n', j1a);
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
fprintf(FID, '%4.4f%4.4f%4.4f%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\*100);
j2b = (100*c2*d);

```

```

fprintf(FID, '\nExercise 2\nMatrix [A]\n');
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f\n', a2);
fprintf(FID, '\nInverse Matrix [A]^-1\n');
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f\n', c2);
fprintf(FID, '\nSolution using [A] \\ $\backslash$  [d] * 100\n');
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f\n', j2a);
fprintf(FID, '\nSolution using [A]^-1 * [d] * 100\n');
fprintf(FID, '%4.4f%4.4f%4.4f%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%4.4f%4.4f%4.4f%4.4f\n', a3);  
fprintf(FID, '\nInverse Matrix [A]-1\n');  
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f%4.4f\n', c3);  
fprintf(FID, '\nSolution using [A] \\ $\backslash$  [d] * 100\n');  
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f%4.4f\n', j3a);  
fprintf(FID, '\nSolution using [A]-1 * [d] * 100\n');  
fprintf(FID, '%4.4f%4.4f%4.4f%4.4f%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

The screenshot shows the MATLAB R2017b interface. The Editor window displays the contents of 'matter.txt' which contains the code for Exercise 3 and its results. The Command Window at the bottom shows the execution of the code and the resulting output.

```
Exercise 3  
Matrix [A]  
0.6800 0.2000 0.0200 0.0090 0.0980  
0.2000 0.6800 0.0200 0.0090 0.0980  
0.0200 0.0200 0.6800 0.0200 0.0980  
0.0090 0.0090 0.0200 0.6800 0.0980  
0.0980 0.0980 0.0980 0.0200 0.6800  
Inverse Matrix [A]-1  
1.0581 1.3824 0.0100 -0.3119 -0.0273  
-0.0527 0.0410 1.0126 -0.0068 -0.0008  
52.6234 -47.7119 -10.5458 5.7902 0.6440  
0.0001 -0.0000 -0.0000 -0.0010 1.0010  
-0.0527 0.0478 0.0106 0.9962 -0.0018  
Solution using [A] \\ $\backslash$  [d] * 100  
21.0528 4.2455 4.2980 70.4011 0.0026  
Exercise 2  
Matrix [A]  
0.4650 0.2000 0.0200 0.0170 0.0980  
0.7400 0.0000 0.0010 0.0300 0.2290  
0.0000 0.9980 0.0010 0.0000 0.0010  
0.0000 0.0000 0.0010 0.0010 0.9980  
0.0000 0.0000 0.0000 0.9980 0.0010  
Inverse Matrix [A]-1  
-0.0548 1.4096 0.0110 -0.3160 -0.0408  
-0.0527 0.0473 1.0126 -0.0067 -0.0005  
52.6063 -47.2745 -10.5423 5.6919 0.5188
```

MATLAB R2017b - academic use

```

HOME PLOTS APPS EDITOR VIEW
FILE NAVIGATE BREAKPOINTS
Search Documentation Log In

Editor - C:\Northeastern University\MATLAB\matter.txt
Name: HW2_Matter.m
File: C:\Northeastern University\MATLAB\HW2_Matter.m
Breakpoints

30 Inverse Matrix [A]^-1
31 -0.0548 1.4006 0.0110 -0.3160 -0.0408
32 -0.0527 0.0473 1.0126 -0.0067 -0.0005
33 52.6063 -47.2745 -10.5423 5.6919 0.5180
34 0.0001 -0.0000 -0.0000 -0.0010 1.0010
35 -0.0527 0.0474 0.0108 0.9963 -0.0015
36
37 Solution using [A] \ [d] * 100
38 21.0331 4.7473 4.3020 70.2883 -0.3706
39
40 Solution using [A]^-1 * [d] * 100
41 21.0331 4.7473 4.3020 70.2883 -0.3706
42
43 Exercise 3
44 Matrix [A]
45 0.6810 0.2000 0.0200 0.0010 0.0980
46 0.7450 0.0000 0.0010 0.0250 0.2290
47 0.0000 0.9980 0.0010 0.0000 0.0010
48 0.0000 0.0000 0.0010 0.0010 0.9980
49 0.0000 0.0000 0.0000 0.9990 0.0010
50
51 Inverse Matrix [A]^-1
52 -0.0544 1.3921 0.0109 -0.3140 -0.0345
53 -0.0527 0.0482 1.0126 -0.0069 -0.0011
54 52.6392 -48.1172 -10.5489 5.6814 1.1456
55 0.0001 -0.0000 -0.0000 -0.0010 1.0010
56 -0.0527 0.0482 0.0106 0.9961 -0.0022
57
58 Solution using [A] \ [d] * 100
59 21.0528 4.2457 4.2980 70.4011 0.0024
60
61 Solution using [A]^-1 * [d] * 100
62 21.0528 4.2457 4.2980 70.4011 0.0024
63
64 Based on the results from Vendor A and Vendor B (Exercise 2 and 3 respectively, I would purchase from Vendor B,
65 This is because Vendor B's alloy scraps and ferrochrome composition create a solution that requires a negative amount
66 of iron. This implies that the total amount of other material excluding iron would exceed 100 kg, the desired amount.

```

plain text file    ln Col ...

7:09 PM 3/18/2018

**Business-Style Letter**  
(see attached file)