```
clear all
close all
clc
```

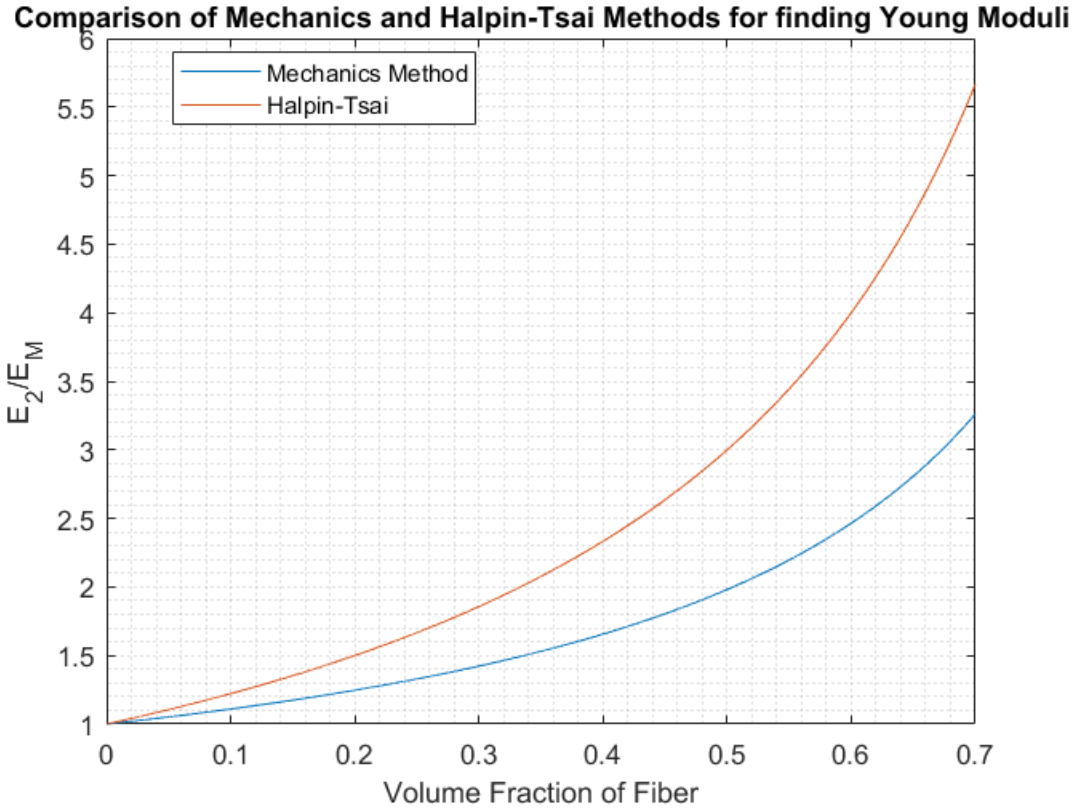
Problem 3.12

Micro Properties

```
E2F=366e9;
EM=3.45e9;
VF=linspace(0, 0.70, 10000);
zeta1=1;


% These values are not needed for this question, but function requires
 input
zeta2=1;
G12F=1;
GM=1;

for i=1:length(VF)
[E2_MM(i), G12_MM(i), E2_HT(i), G12_HT(i)]=HW3_function(E2F, EM,
 VF(i), G12F, GM, zeta1, zeta2);
end

for i=1:length(VF)
if VF(i)>=.1
    E2_MM_1=E2_MM(i)
    E2_HT_1=E2_HT(i)
    break
end
end

for i=1:length(VF)
if VF(i)>=.4
    E2_MM_4=E2_MM(i)
    E2_HT_4=E2_HT(i)
    break
end
end

for i=1:length(VF)
if VF(i)>=.7
    E2_MM_7=E2_MM(i)
    E2_HT_7=E2_HT(i)
    break
end
end

% Plot 3.12
plot(VF, E2_MM/EM)
```

```
hold on
plot(VF, E2_HT/EM)
grid minor
legend('Mechanics Method', 'Halpin-Tsai', 'location', 'best')
xlabel('Volume Fraction of Fiber')
ylabel('E_2/E_M')
title('Comparison of Mechanics and Halpin-Tsai Methods for finding
 Young Moduli')

figure
```

```
E2_MM_1 =

   3.8295e+09


E2_HT_1 =

   4.2170e+09


E2_MM_4 =

   5.7143e+09


E2_HT_4 =

   8.0504e+09


E2_MM_7 =

   1.1253e+10


E2_HT_7 =

   1.9550e+10
```


Comparison of Mechanics and Halpin-Tsai Methods for finding Young Moduli
Mechanics Method
Halpin-Tsai
E2/EM
Volume Fraction of Fiber
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

Problem 3.19

```
clear all



VF=linspace(0, 0.60, 10000);%Volume Fraction Fiber
G12F=28.3e9;%Shear Modulus Fiber
GM=1.27e9;%Shear Modulus Matrix
zeta2=1;%Reinforcing Efficiency Factor

% These values are not needed for this question, but function requires
 input
E2F=366e9;
EM=3.45e9;
zeta1=1;


for i=1:length(VF)
[E2_MM(i), G12_MM(i), E2_HT(i), G12_HT(i)]=HW3_function(E2F, EM,
 VF(i), G12F, GM, zeta1, zeta2);
end

for i=1:length(VF)
if VF(i)>=.1
    G12_MM_1=G12_MM(i)
    G12_HT_1=G12_HT(i)
    break
end
end

for i=1:length(VF)
if VF(i)>=.3
    G12_MM_3=G12_MM(i)
    G12_HT_3=G12_HT(i)
    break
end
end

for i=1:length(VF)
if VF(i)>=.6
    G12_MM_6=G12_MM(i)
    G12_HT_6=G12_HT(i)
    break
end
end


% Plot 3.19
plot(VF, G12_MM/GM)
hold on
plot(VF, G12_HT/GM)
grid minor
```

```
legend('Mechanics Method', 'Halpin-Tsai', 'location', 'best')
xlabel('Volume Fraction of Fiber')
ylabel('G_1_2/G_M')
title('Comparison of Mechanics and Halpin-Tsai Methods for finding
 Shear Moduli')
```

```
G12_MM_1 =

   1.4042e+09
```

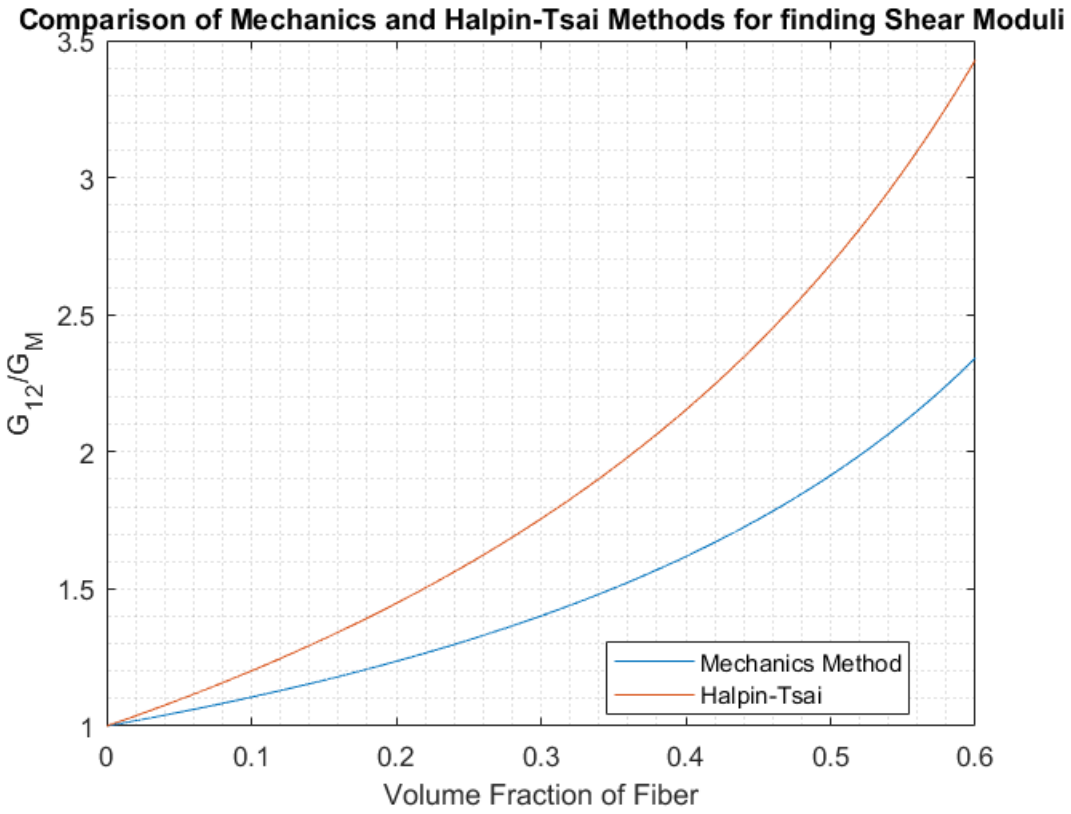
```
G12_HT_1 =

   1.5256e+09
```

```
G12_MM_3 =

   1.7801e+09
```

```
G12_HT_3 =

   2.2299e+09
```

```
G12_MM_6 =

   2.9748e+09
```

```
G12_HT_6 =

   4.3552e+09
```



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