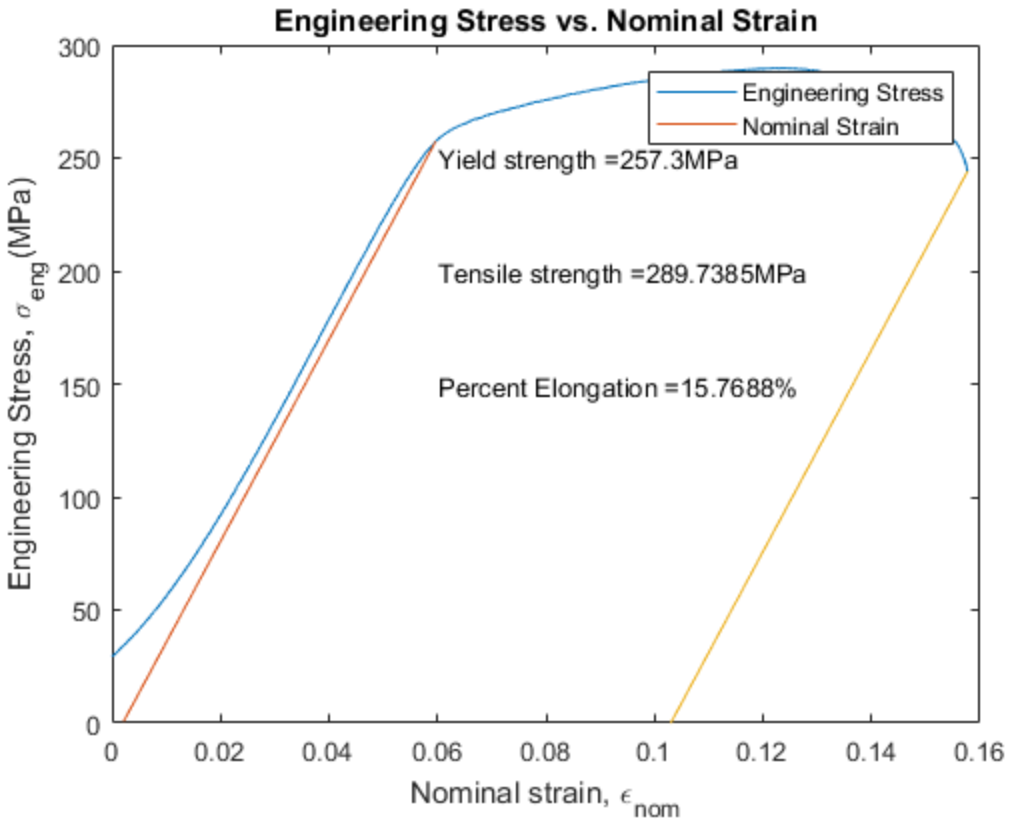
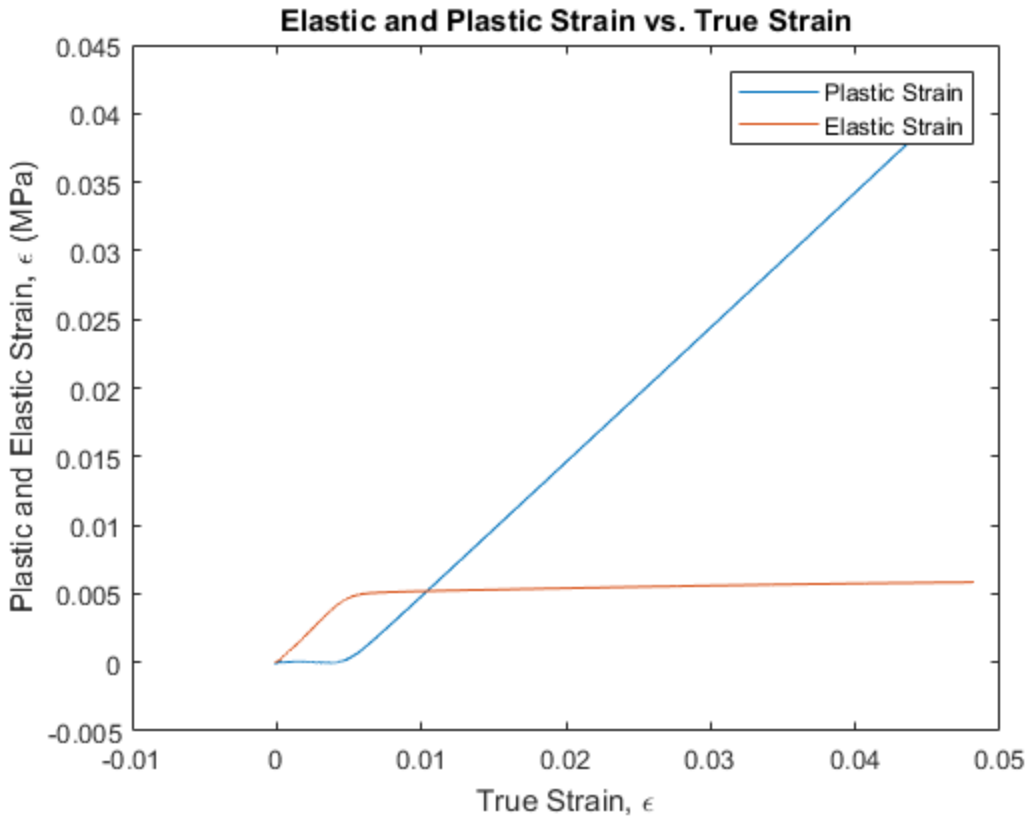
```
clear all
close all
a=xlsread('Al1.csv');
displacement = a(:,2);
force        = a(:,3);% xlsread('Al1.csv', 'c:c');
extensometer = a(:,4);%xlsread('Al1.csv', 'd:d');

ending = length(displacement);
for m = 1:ending
    if (force(m)>15)
        begfit = m;
        break
    end
end

for m = 1:ending
    if(force(m)>25)
        endfit = m;
        break
    end
end

maxdiff = 0;
for dog = 1:ending-1
    if maxdiff < (force(dog) - force(dog+1))
        fracture = dog;
        maxdiff = force(dog) - force(dog+1);
    end
end

p = polyfit(displacement(begfit:endfit), force(begfit:endfit),1);

spgage = 50;
extgage= 25.4;
xsec   = 6.22*18.22*1e-6;
actoff = -p(2)/p(1);
nomstrain=(displacement(1:fracture)-actoff)/spgage;

engstress=(0.001*force(1:fracture))/xsec;
plot(nomstrain,engstress)

p=polyfit(nomstrain(begfit:endfit),engstress(begfit:endfit),1);
enom=p(1);
offline1=enom*(nomstrain-0.002);


for m=1:fracture
    if (offline1(m)>engstress(m))
        ysnom = engstress(m);
        offstop = m;
        break
    end
```

```
end
for m = 1:fracture
    if(offline1(m)>0)
        offstart = m;
        break
    end
end

plot(nomstrain,
 engstress,'.',nomstrain(offstart:offstop),offline1(offstart:offstop),'.')


[ts,uniform]=max(engstress);

ductility=-(engstress(fracture)-enom*nomstrain(fracture))/enom;
ducline1=enom*(nomstrain-ductility);


for m=1:fracture
    if (ducline1(m)>engstress(m))
        ysnom = engstress(m);
        ducstop = m;
        break
    end
end
for m = 1:fracture
    if(ducline1(m)>0)
        ducstart = m;
        break
    end
end


plot(nomstrain,
 engstress,nomstrain(offstart:offstop),offline1(offstart:offstop),nomstrain(ducsta
xlabel('Nominal strain, \epsilon_{nom}')
ylabel('Engineering Stress, \sigma_{eng}(MPa)')
legend('Engineering Stress', 'Nominal Strain')
xmin = 0;
xmax = .16;
ymin = 0;
ymax = 300;
axis([xmin,xmax,ymin,ymax])
ystxt = num2str(ysnom,4);
text(.06,250,strcat('Yield strength =', ystxt,'MPa'))
title('Engineering Stress vs. Nominal Strain')
text(.06,200,strcat('Tensile strength =',
 num2str(max(engstress)),'MPa'))
text(.06,150,strcat('Percent Elongation =',
 num2str(100*max(nomstrain)),'%'))
```



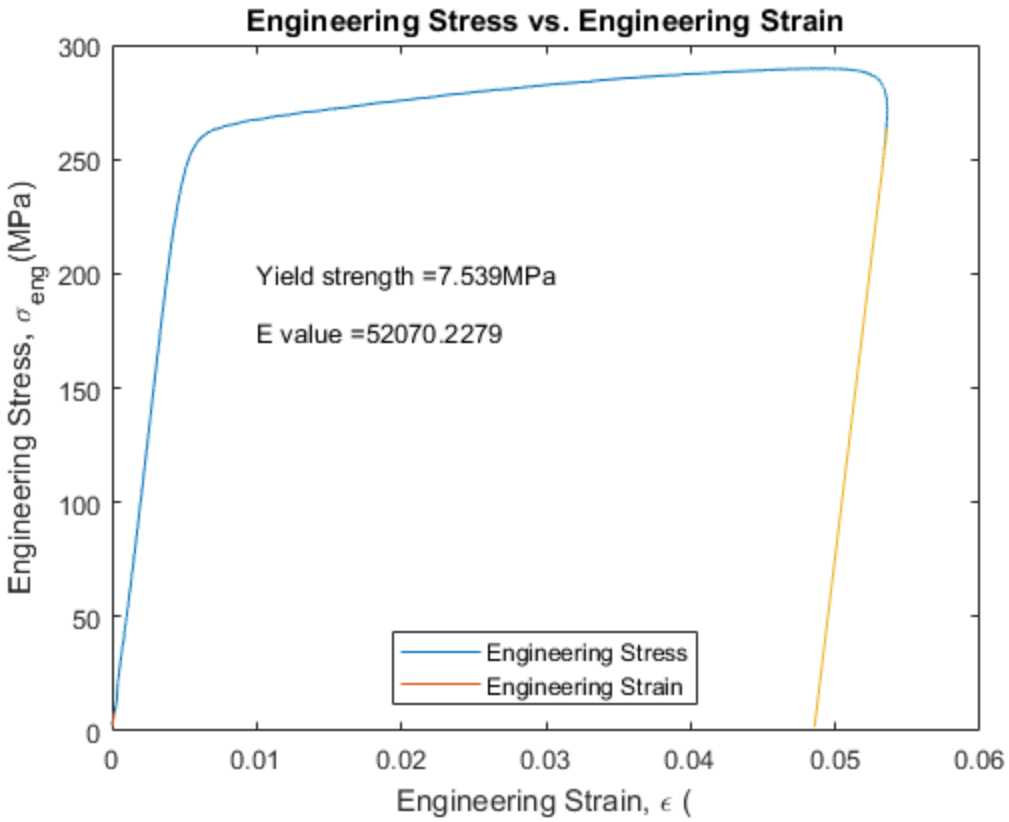

```
ending = length(force);
for m = 1:ending
    if (force(m)>15)
        begfit = m;
        break
    end
end

for m = 1:ending
    if(force(m)>25)
        endfit = m;
        break
    end
end

maxdiff = 0;
for dog = 1:ending-1
    if maxdiff < (force(dog) - force(dog+1))
        fracture = dog;
        maxdiff = force(dog) - force(dog+1);
    end
end

p = polyfit(extensometer(begfit:endfit), force(begfit:endfit),1);

spgage = 50;
```

```
extgage= 25.4;
xsec   = 6.22*18.22*1e-6;
actoff = -p(2)/p(1);

engstrain = (extensometer(1:fracture)-actoff)/extgage;

engstress=(0.001*force(1:fracture))/xsec;
plot(engstrain,engstress)

p=polyfit(engstrain(begfit:endfit),engstress(begfit:endfit),1);
enom = p(1);

[ts,uniform]=max(engstress);



truestress = engstress(1:uniform).*(1 + engstrain(1:uniform));

truestrain = log(1 + engstrain(1:uniform));

elasticstrain = truestress/enom;

plasticstrain = truestrain - elasticstrain;

plot(truestrain, plasticstrain, truestrain, elasticstrain)
 xlabel('True Strain, \epsilon')
 ylabel('Plastic and Elastic Strain, \epsilon (MPa)')
 legend('Plastic Strain', 'Elastic Strain')
 title('Elastic and Plastic Strain vs. True Strain')
```




```
engstrain = (extensometer(1:fracture)-actoff)/extgage;


offline2 = enom*(engstrain);

for m=1:fracture
    if (offline2(m)>engstress(m))
        ysnom = engstress(m);
        offstop2 = m;
        break
    end
end
for m = 1:fracture
    if(offline2(m)>0)
        offstart2 = m;
        break
    end
end

plot(engstrain,
 engstress,'.',engstrain(offstart2:offstop2),offline2(offstart2:offstop2),'.')


[ts,uniform]=max(engstress);

ductility=-(engstress(fracture)-enom*engstrain(fracture))/enom;
```

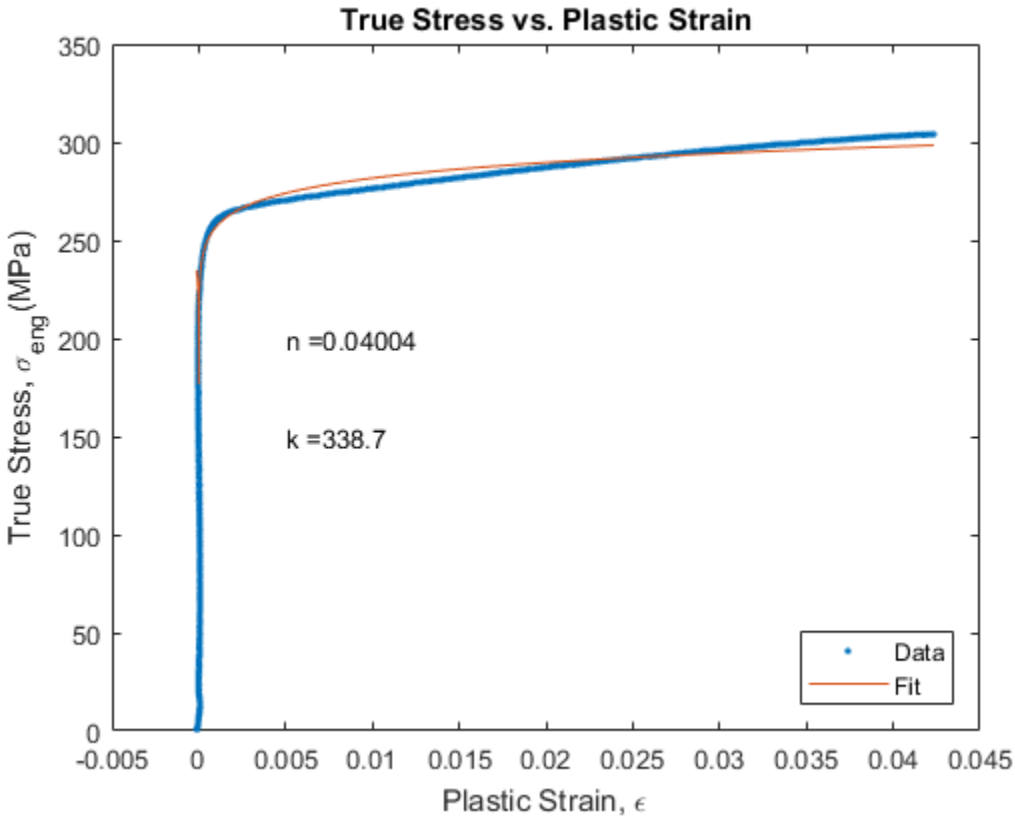
```
ducline1=enom*(engstrain-ductility);


for m=1:fracture
    if (ducline1(m)>engstress(m))
        ysnom = engstress(m);
        ducstop = m;
        break
    end
end
for m = 1:fracture
    if(ducline1(m)>0)
        ducstart = m;
        break
    end
end


plot(engstrain,
 engstress,engstrain(offstart2:offstop2),offline2(offstart2:offstop2),engstrain(du
xlabel('Engineering Strain, \epsilon (')
ylabel('Engineering Stress, \sigma_{eng}(MPa)')
xmin = 0;
xmax = .06;
ymin = 0;
ymax = 300;
axis([xmin,xmax,ymin,ymax])
ystxt = num2str(ysnom,4);
text(.01,200,strcat('Yield strength =', ystxt,'MPa'))
text(.01,175,strcat('E value =', num2str(enom)))

title('Engineering Stress vs. Engineering Strain')
legend('Engineering Stress', 'Engineering
 Strain', 'location', 'south')
```




```
for m = uniform:-1:1
    if plasticstrain(m) < 0
        rowstart = m+1;
        break
    end
end

logtruestress=log10(truestress(rowstart:uniform));
logplasticstrain=log10(plasticstrain(rowstart:uniform));

p = polyfit(logplasticstrain,logtruestress,1);

n = p(1);
K = 10^p(2);
fitpow = K.*(plasticstrain.^n);

plot(plasticstrain,truestress,'.',plasticstrain,fitpow)

 xlabel('Plastic Strain, \epsilon')
 ylabel('True Stress, \sigma_{eng}(MPa)')
 legend('Data', 'Fit', 'location','southeast')

 ntext = strcat('n = ' , num2str(n,4));
 ktext =  strcat('k = ' , num2str(K,4));
 text(.005,200,ntext)
 text(.005,150,ktext)
```

```
title('True Stress vs. Plastic Strain')
```

Warning: Imaginary parts of complex X and/or Y arguments ignored



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