Assignment 3
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Question 2

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$0 \rightarrow 90°$

Carbon epoxy		chosen
$\sigma_L^+ \Rightarrow$	850 - 1500	1500
$\sigma_L^- \Rightarrow$	700 - 1200	1200
$\sigma_T^+ \Rightarrow$	35 - 40	40
$\sigma_T^- \Rightarrow$	130 - 190	190
$\tau_{LT} \Rightarrow$	60 - 75	75

$$F_{11}\sigma_1^2 + F_{22}\sigma_2^2 + F_{66}\tau_{12}^2 + F_1\sigma_1 + F_2\sigma_2 + 2F_1\sigma_1\sigma_2 \geq 1$$

$\sigma_1 = 1500$ $\sigma_2^- = ?$ $\tau_{12} = ?$

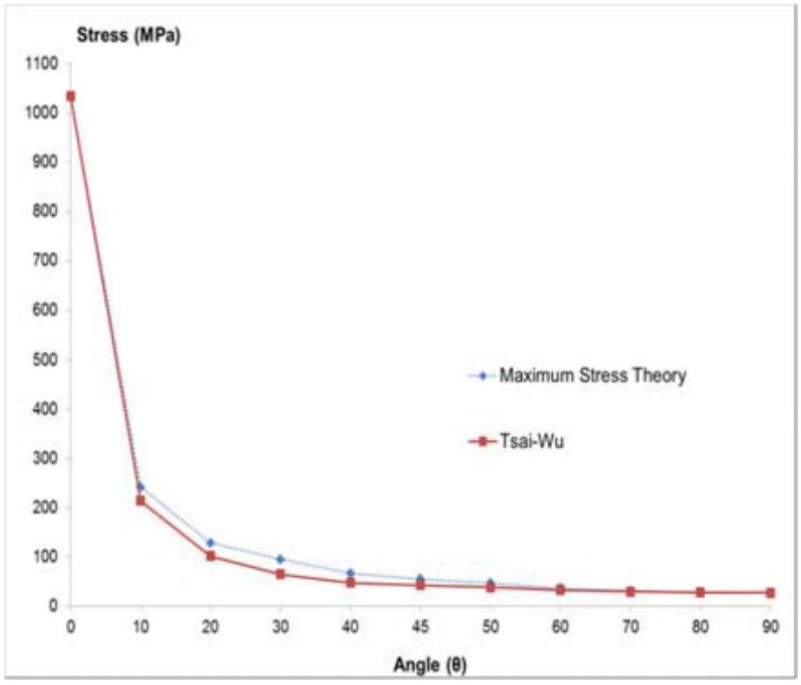
$$\begin{bmatrix} \sigma_{11} \\ \sigma_{22} \\ \tau_{12} \end{bmatrix} = [T] \begin{bmatrix} \sigma_{xx} \\ \sigma_{yy} \\ \tau_{xy} \end{bmatrix}$$

Assume $\sigma_{11} = 850$ $\sigma_{22} = 0$ $\tau_{12} = 0$

$$T = \begin{bmatrix} \cos^2\theta & \sin^2\theta & 2\cos\theta\sin\theta \\ \sin^2\theta & \cos^2\theta & -2\cos\theta\sin\theta \\ \sin\theta\cos\theta & \cos\theta\sin\theta & \cos^2\theta - \sin^2\theta \end{bmatrix}$$

Tsai Wu = 1 //

* code wasn't working to get a graph for σ_{xx} and θ *
I have found an example online to use for discussion instead, so it will be used :



Reference: https://www.researchgate.net/figure/Figure-7-Failure-curves-for-symmetric-T-laminate-Maximum-Stress-Theory-and_fig2_283353092

When viewing the two graphs, Tsai-Wu is more accurate than Maximum stress Theory taking a more accurate line closer to the real results. This was already known as seen in stress graphs the Maximum stress theory is a box compared to Tsai-Wu's ellipse.

Code:

```
%Lamina Stresses in material Coordinates
S=[1500;0;0];
%Angle range
x=[-90:1:90]
%Transform Matrix
T=[(cosd(x)).^2 (sind(x)).^2 2.*(cosd(x)).*(sind(x));(sind(x)).^2 (cosd(x)).^2 -2.*(cosd(x)).*(sind(x)); -1*(cosd(x)).*(sind(x)) (cosd(x)).*(sind(x)) ((sind(x)).^2)-((cosd(x)).^2)];

%Solving for Sxx
Sxx=linsolve(T,S)

%Tsai Wu Criterion
sigmaLplus=1500;
sigmaLminus=-1200;
sigmaTplus=40;
sigmaTminus=-190;
TLT=75;

F11= 1/((sigmaLplus)*(sigmaLminus));
F22= 1/((sigmaTplus)*(sigmaTminus));
F1= (1/(sigmaLplus))-(1/(sigmaLminus));
F2= (1/(sigmaTplus))-(1/(sigmaTminus));
F66= 1/(TLT.^2);
F12= (-1/2)*(sqrt(1/(sigmaLplus*sigmaLminus*sigmaTplus*sigmaTminus)));

TsaiWu= (F11*(S(1,1).^2))+(F22*(0).^2)+(F66*(0.^2))+(F1*S(1,1))+(F2*0)+ 2*(F12*S(1,1)*0)
```