Max load is Px = 131595 N using max stress

Max load is Px = -106428 N using Tsai Wu

Max load is Mx = 56.5544 Nm using max stress

Max load is Mx = 42.8641 Nm using Tsai Wu

Main:

```
clc;clear;

L=0.254;
W=0.254;

laminate =
[138e9,9e9,6.9e9,0.3,0.0002,0,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0;...

138e9,9e9,6.9e9,0.3,0.0002,30,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0;...
            138e9,9e9,6.9e9,0.3,0.0002,-
30,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0;...
            138e9,9e9,6.9e9,0.3,0.0002,-
30,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0;...

138e9,9e9,6.9e9,0.3,0.0002,30,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0;...

138e9,9e9,6.9e9,0.3,0.0002,0,1448e6,1172e6,48.3e6,248e6,62.1e6,0,0,0,0,0,0];


[PxMaxStress]=compositePlateFailureMaxStress(laminate,L,W);

[PxMaxTsaiWu]=compositePlateFailureTsaiWu(laminate,L,W);

fprintf('Max load is Px = %g N using max stress\n',PxMaxStress)
fprintf('Max load is Px = %g N using Tsai Wu\n',PxMaxTsaiWu)

[MxMaxStress]=compositePlateFailureMaxStressMx(laminate,L,W);

[MxMaxTsaiWu]=compositePlateFailureTsaiWuMx(laminate,L,W);

fprintf('Max load is Mx = %g Nm using max stress\n',MxMaxStress)
fprintf('Max load is Mx = %g Nm using Tsai Wu\n',MxMaxTsaiWu)
```

Functions:

```
function [PxMax]=compositePlateFailureMaxStress(laminate,L,W)

[~,~,~,~,~,~,longStrengthTen,longStrengthCom,tranStrengthTen,tranStrengthCom,
strengthLT,~,~,~,~,~,~] = laminateReader(laminate);


Nx=1/W;
Ny=0;
Nxy=0;
Mx=0;
My=0;
Mxy=0;

[~,~,~,sigma1,sigma2,tau12,~,~,~,~,~,~]=forces2StressStrainLaminateNoPlot(lam
inate,Nx,Ny,Nxy,Mx,My,Mxy);

for i=2:2:length(sigma1)
    PxTen1(i)=longStrengthTen(i/2)/sigma1(i);
    PxCom1(i)=longStrengthCom(i/2)/sigma1(i);
    PxTen2(i)=tranStrengthTen(i/2)/sigma2(i);
    PxCom2(i)=tranStrengthCom(i/2)/sigma2(i);
    Px12(i)=strengthLT(i/2)/tau12(i);
    PxTen1(i-1)=longStrengthTen(i/2)/sigma1(i-1);
    PxCom1(i-1)=longStrengthCom(i/2)/sigma1(i-1);
    PxTen2(i-1)=tranStrengthTen(i/2)/sigma2(i-1);
    PxCom2(i-1)=tranStrengthCom(i/2)/sigma2(i-1);
    Px12(i-1)=strengthLT(i/2)/tau12(i-1);
end

PxTen1Max=min(PxTen1);
PxCom1Max=min(abs(PxCom1));
PxTen2Max=min(PxTen2);
PxCom2Max=min(abs(PxCom2));
Px12Max=min(abs(Px12));

PxMax=[PxTen1Max,PxCom1Max,PxTen2Max,PxCom2Max,Px12Max];
PxMax=min(abs(PxMax));

end


function [PxMaxTsaiWu]=compositePlateFailureTsaiWu(laminate,L,W)
[~,~,~,~,~,~,longStrengthTen,longStrengthCom,tranStrengthTen,tranStrengthCom,
strengthLT,~,~,~,~,~,~] = laminateReader(laminate);


Nx=1/W;
Ny=0;
Nxy=0;
Mx=0;
My=0;
Mxy=0;
```

```
[~,~,~,sigma1,sigma2,tau12,~,~,~,~,~,~]=forces2StressStrainLaminateNoPlot(lam
inate,Nx,Ny,Nxy,Mx,My,Mxy);

for i=2:2:length(sigma1)

    F11=1/(longStrengthTen(i/2)*longStrengthCom(i/2));
    F22=1/(tranStrengthTen(i/2)*tranStrengthCom(i/2));
    F66=1/strengthLT(i/2)^2;
    F1=(1/longStrengthTen(i/2))-(1/longStrengthCom(i/2));
    F2=(1/tranStrengthTen(i/2))-(1/tranStrengthCom(i/2));

    C1=(F11*sigma1(i)^2+F22*sigma2(i)^2+F66*tau12(i)^2);
    C2=F1*sigma1(i)+F2*sigma2(i);
    C3=-1;
    C=[C1,C2,C3];
    sol=roots(C);
    PxMax(1,i)=sol(1);
    PxMax(2,i)=sol(2);

    C1=(F11*sigma1(i-1)^2+F22*sigma2(i-1)^2+F66*tau12(i-1)^2);
    C2=F1*sigma1(i-1)+F2*sigma2(i-1);
    C3=-1;
    C=[C1,C2,C3];
    sol=roots(C);
    PxMax(1,i-1)=sol(1);
    PxMax(2,i-1)=sol(2);
end

[PxMaxTsaiWu,I]=min(abs(PxMax),[],'all','linear');
PxMaxTsaiWu=PxMax(I);

end


function [MxMax]=compositePlateFailureMaxStressMx(laminate,L,W)

[~,~,~,~,~,~,longStrengthTen,longStrengthCom,tranStrengthTen,tranStrengthCom,
strengthLT,~,~,~,~,~,~] = laminateReader(laminate);


Nx=0;
Ny=0;
Nxy=0;
Mx=1/W;
My=0;
Mxy=0;

[~,~,~,sigma1,sigma2,tau12,~,~,~,~,~,~]=forces2StressStrainLaminateNoPlot(lam
inate,Nx,Ny,Nxy,Mx,My,Mxy);

for i=2:2:length(sigma1)
    PxTen1(i)=longStrengthTen(i/2)/sigma1(i);
    PxCom1(i)=longStrengthCom(i/2)/sigma1(i);
    PxTen2(i)=tranStrengthTen(i/2)/sigma2(i);
    PxCom2(i)=tranStrengthCom(i/2)/sigma2(i);
```

```
    Px12(i)=strengthLT(i/2)/tau12(i);
    PxTen1(i-1)=longStrengthTen(i/2)/sigma1(i-1);
    PxCom1(i-1)=longStrengthCom(i/2)/sigma1(i-1);
    PxTen2(i-1)=tranStrengthTen(i/2)/sigma2(i-1);
    PxCom2(i-1)=tranStrengthCom(i/2)/sigma2(i-1);
    Px12(i-1)=strengthLT(i/2)/tau12(i-1);
end

PxTen1Max=min(PxTen1);
PxCom1Max=min(abs(PxCom1));
PxTen2Max=min(PxTen2);
PxCom2Max=min(abs(PxCom2));
Px12Max=min(abs(Px12));

MxMax=[PxTen1Max,PxCom1Max,PxTen2Max,PxCom2Max,Px12Max];
MxMax=min(abs(MxMax));

end


function [MxMaxTsaiWu]=compositePlateFailureTsaiWuMx(laminate,L,W)
[~,~,~,~,~,~,longStrengthTen,longStrengthCom,tranStrengthTen,tranStrengthCom,
strengthLT,~,~,~,~,~,~] = laminateReader(laminate);



Nx=0;
Ny=0;
Nxy=0;
Mx=1/W;
My=0;
Mxy=0;

[~,~,~,sigma1,sigma2,tau12,~,~,~,~,~,~]=forces2StressStrainLaminateNoPlot(lam
inate,Nx,Ny,Nxy,Mx,My,Mxy);

for i=2:2:length(sigma1)

    F11=1/(longStrengthTen(i/2)*longStrengthCom(i/2));
    F22=1/(tranStrengthTen(i/2)*tranStrengthCom(i/2));
    F66=1/strengthLT(i/2)^2;
    F1=(1/longStrengthTen(i/2))-(1/longStrengthCom(i/2));
    F2=(1/tranStrengthTen(i/2))-(1/tranStrengthCom(i/2));

    C1=(F11*sigma1(i)^2+F22*sigma2(i)^2+F66*tau12(i)^2);
    C2=F1*sigma1(i)+F2*sigma2(i);
    C3=-1;
    C=[C1,C2,C3];
    sol=roots(C);
    MxMax(1,i)=sol(1);
    MxMax(2,i)=sol(2);

    C1=(F11*sigma1(i-1)^2+F22*sigma2(i-1)^2+F66*tau12(i-1)^2);
    C2=F1*sigma1(i-1)+F2*sigma2(i-1);
    C3=-1;
    C=[C1,C2,C3];
```

```
    sol=roots(C);
    MxMax(1,i-1)=sol(1);
    MxMax(2,i-1)=sol(2);
end

[MxMaxTsaiWu,I]=min(abs(MxMax),[],'all','linear');
MxMaxTsaiWu=MxMax(I);

end
```