Question 1:

function [ABDmatrix,distances,Qbars,Sbars] = laminateStiffnessMatrix(thicknesses,thetas,E1s,E2s,G12s,v12s)

A=zeros(3);

B=zeros(3);

D=zeros(3);

N=length(thicknesses);

thickness=sum(thicknesses);

distances=zeros(1,length(thicknesses)+1);

distances(1)=-thickness/2;

distances(end)=thickness/2;

for i=2:N

distances(i)=distances(i-1)+thicknesses(i-1);

end

Qbars{1}=[];

Sbars{1}=[];

for k=1:N

Qbar = transReducedStiffnessMatrix(E1s(k),E2s(k),G12s(k),v12s(k),thetas(k));

Qbars{k}=Qbar;

end

for i=1:3

for j=1:3

for k=1:N

A(i,j)=A(i,j)+(Qbars{k}(i,j)\*(distances(k+1)-distances(k)));

B(i,j)=B(i,j)+(Qbars{k}(i,j)\*(1/2)\*(distances(k+1)^2-distances(k)^2));

D(i,j)=D(i,j)+(Qbars{k}(i,j)\*(1/3)\*(distances(k+1)^3-distances(k)^3));

end

end

end

ABDmatrix=[A,B;B,D];

end

MAIN:

clc;clear;

E1s=[140e9,140e9,140e9,140e9,140e9,140e9];

E2s=[10e9,10e9,10e9,10e9,10e9,10e9];

G12s=[7e9,7e9,7e9,7e9,7e9,7e9];

v12s=[0.3,0.3,0.3,0.3,0.3,0.3];

thicknesses=[0.0002,0.0002,0.0002,0.0002,0.0002,0.0002];

thetas=[0,30,-30,-30,30,0];

ABDmatrix1 = laminateStiffnessMatrix(thicknesses,thetas,E1s,E2s,G12s,v12s);

E1s=[140e9,140e9,140e9,140e9,140e9,140e9];

E2s=[10e9,10e9,10e9,10e9,10e9,10e9];

G12s=[7e9,7e9,7e9,7e9,7e9,7e9];

v12s=[0.3,0.3,0.3,0.3,0.3,0.3];

thicknesses=[0.0002,0.0002,0.0002,0.0002,0.0002,0.0002];

thetas=[30,-15,-75,20,-60,-30];

ABDmatrix2 = laminateStiffnessMatrix(thicknesses,thetas,E1s,E2s,G12s,v12s);

OUTPUT:

Part a:

A screenshot of a computer

Description automatically generated with medium confidence

Part b:

Graphical user interface, application, table, Excel

Description automatically generated

Problem 2:

function [ABDmatrixINV,distances,Qbars,Sbars] = laminateStiffnessMatrixINV(thicknesses,thetas,E1s,E2s,G12s,v12s)

[ABDmatrix,distances,Qbars,Sbars] = laminateStiffnessMatrix(thicknesses,thetas,E1s,E2s,G12s,v12s);

ABDmatrixINV=ABDmatrix^-1;

end

Part a:

Graphical user interface, table, Excel

Description automatically generated

Part b:

Graphical user interface, application, table, Excel

Description automatically generated