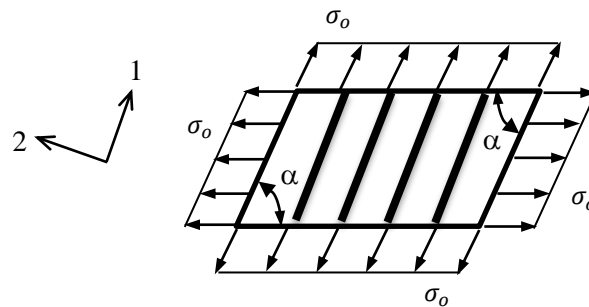# Composite Materials: Analysis and Design

Homework no.2

Problem 1

For a lamina of glass/epoxy, calculate the followings:

1. Transformed compliance matrix
2. Transformed reduced stiffness matrix
3. Global strains
4. Local strains
5. Local stresses
6. Principal stresses
7. Maximum shear stress

Problem 2

Consider a plane element of size 50mm×50mm made of graphite-epoxy lamina. The element is subjected to a tensile stress σ_x = 300MPa. Use MATLAB to calculate the strains and the deformed dimensions of the element in the following two cases:

(a) The fibers are aligned along the x-axis.

(b) The fibers are inclined to the x-axis with an orientation angle $\theta = 45$

(c) The fibers are inclined to the x-axis with an orientation angle $\theta = -45$

Problem 3

Consider a glass/epoxy lamina; use MATLAB to plot the values of the six elements $\overline{Q}_{ij}$ of the transformed reduced stiffness matrix $[\overline{Q}]$ as a function of the orientation angle θ in the range: $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$