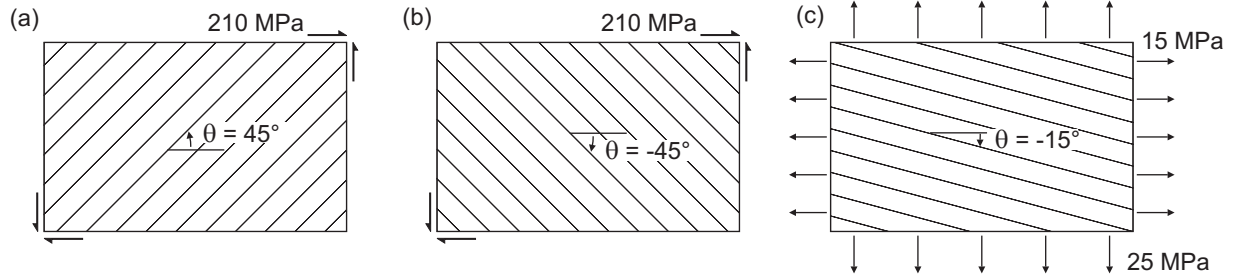


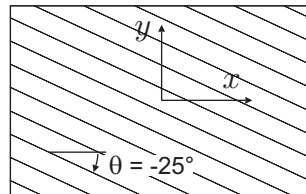
MECA-H-406 Composite structures - Exercises 4

1. According to the Tsai-Hill criterion (maximum work theory), determine if the following laminated composites will survive the load applied.

$$\sigma_{LU} = 1950 \text{ MPa}, \sigma_{TU} = 50 \text{ MPa}, \sigma'_{LU} = 1150 \text{ MPa}, \sigma'_{TU} = 230 \text{ MPa}, \tau_{LTU} = 125 \text{ MPa}.$$

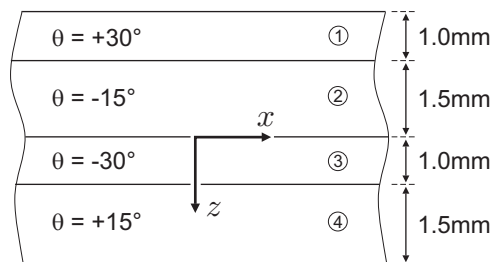


2. Consider a carbon-epoxy composite with $\alpha_L = -0.4e-6 \text{ 1/K}$ and $\alpha_T = 28e-6 \text{ 1/K}$. Compute the coefficients of thermal expansion in the $\{x, y\}$ frame.



3. Consider a four-ply laminate with identical layers so that $E_L=41 \text{ GPa}$, $E_T=8 \text{ GPa}$, $\nu_{LT}=0.28$, $G_{LT}=4.1 \text{ GPa}$; compute :

- the stiffness matrix of each ply in the $\{x, y\}$ frame.
- the matrices A , B and D of the laminate.



4. For each of the laminates below, describe the deformation under a unidirectional traction N_x and under a bending moment M_x .

