

Composite Materials: Analysis and Design

Homework no.3

Problem 1

Starting from the expression for the reduced stiffness element

$$\bar{Q}_{22} = Q_{11}s^4 + Q_{22}c^4 + 2(Q_{12} + 2Q_{66})s^2c^2$$

derive the expression

$$\bar{Q}_{22} = U_1 - U_2 \cos 2\theta + U_3 \cos 4\theta$$

Problem 2

Develop a failure envelope (three-dimensional plot of the combinations of the normal and shear stresses) for the 45° lamina of glass/epoxy.

Problem 3

For each of the following loading cases, rank the three theories (Maximum Stress, Maximum Strain and Tsai-Wu) from the most conservative to the least conservative:

