

AOE 3024, Thin Walled Structures

Homework # 1, Due September 5, 2001

NAME

Pledge

The state of stress at a point in a component is given as

$$\begin{bmatrix} 40 & 40 & 0 \\ 40 & 50 & -60 \\ 0 & -60 & 40 \end{bmatrix} \text{ MPa}$$

- Show this state of stress on a differential element (5 points).
- Determine the stress vectors and the total force vectors acting on the faces OAC, OBC, and OBA. Note that $OA = 2OB = 2OC = \Delta$ (10 points).
- Determine the stress vector acting on the face ABC (10 points).

(Hint: The element OABC is in static equilibrium. The forces acting on face OABC should be in static equilibrium with the forces acting on the three mutually orthogonal faces OAC, OBC, and OBA. You will also need to determine the unit normal acting on plane ABC. To accomplish this goal, please consult any book on plane analytic geometry. Note that the co-ordinates of Points A, B, and C are, respectively, $(\Delta, 0, 0)$, $(0, \Delta/2, 0)$, and $(0,0, \Delta/2)$