

Mohr's Circle Lab - Handout
November 14, 2011

Problems

1. Consider the stress block of Figure 1 found at a point in a structural element.

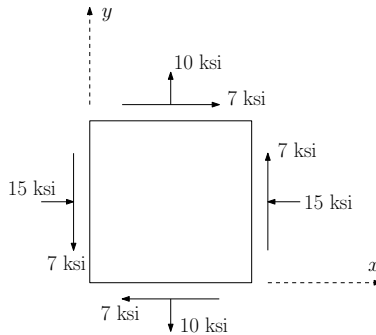


Figure 1: 2D stress block.

- (a) Plot Mohr's circle that corresponds to the above state of stress.
- (b) Find the principle stresses for the given stress block using Mohr's circle. At what angle is the principle stress block from the given block? Draw the principle stress block at the correct angle relative to the given block.
- (c) Find the maximum shear stress (in-plane) and average normal stress for the given state of stress. At what angle is this state of stress from the given block? At what angle is it from the principle block? Draw this stress block that has the maximum shear stress.
- (d) Determine the state of stress on a stress block rotated +55 degrees from the given stress block. Draw this state of stress on a stress block.
2. Repeat problem 1 for the given stress block of Figure 2.

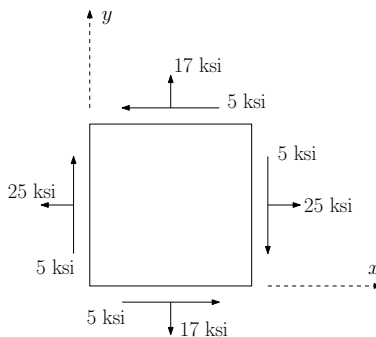


Figure 2: 2D stress block.

3. Repeat problem 1 for the given stress block of Figure 3.

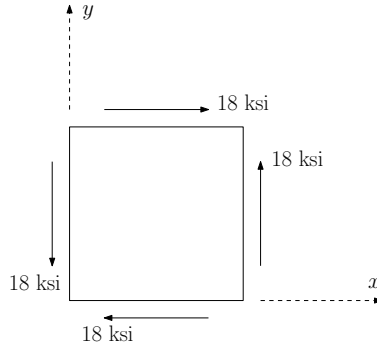


Figure 3: 2D stress block.

4. For the stress block of problem 2 plot the Mohr's circles for the state of stress for the xy plane, yz plane and the xz plane. Identify (label) each circle as it corresponds to each plane listed above.
5. Given the following principle stresses ($\sigma_{max} = 50$ ksi, $\sigma_{int} = 30$ ksi, $\sigma_{min} = -10$ ksi), draw the 3D Mohr's circle. What is the absolute maximum shear stress?
6. Given the state of stress in Figure 4, determine the principle stresses. Draw Mohr's circle for this case. Determine the absolute maximum shear stress.

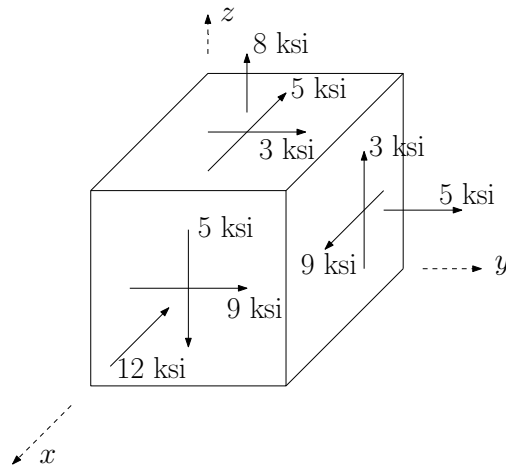


Figure 4: 3D stress block.