

GY403 Structural Geology Stress Problem

Introduction

For this problem use the “resolution of forces” method to solve for the normal stress (σ) and shear stress (τ) acting on a particular plane. Remember that this plane may or may not develop into a fracture so it is probably best to treat the plane as a purely imaginary geometry. As a check, you can use the Mohr Stress Circle equations on the results of your solution. However, I will be grading your answer on the basis of the resolution of force method (i.e. convert the σ_1 and σ_3 stress tensors to force vectors). The following conventions will be used in the problem statement:

σ_1 : maximum compressive stress tensor direction

σ_3 : minimum compressive stress tensor direction

θ : angle measured from the plane under consideration to the σ_1 direction. Clockwise angles are considered positive and produce dextral shear, whereas counterclockwise angles are considered negative and produce sinistral shear stress.

Given

$$\sigma_1 = 50 \text{ MPa}$$

$$\sigma_3 = 15 \text{ MPa}$$

$$\theta = -35^\circ$$

Calculate

1. Normal stress (σ) on the plane under consideration
2. Shear stress (τ) on the plane under consideration

