

Structural Geology Mohr-circle homework

Goal: To understand how to plot and interpret Mohr Circles in stress space.

1) You are working for Anaconda Mining Co. in Arizona. A distinctive dolostone bed forms part of the wall rock of one of their deep shafts, and they are worried about rock falls as they remove material from the shaft. The company has conducted a wide range of failure experiments on this dolostone and has determined that it has:

a cohesive strength of 70 MPa (Megapascals)

an angle of internal friction of 30° .

an angle of sliding friction of 40° for confining pressures less than 200 Mpa

an angle of sliding friction of 35° for confining pressures greater than 200 MPa

Plot both the Coulomb failure envelope and the Envelope of sliding friction on the same Mohr diagram. You only need to plot the envelopes for positive stress space ($\sigma_s > 0$ and $\sigma_n > 0$). Be sure to scale your x-axis so that it goes to at least 1000 MPa.

2) Given a confining pressure of 100 Mpa and a differential stress of 400 Mpa, use a Mohr circle to find the range of fracture dips that will slide if σ_1 is: (A) horizontal and (B) vertical.

3) Given a confining pressure of 350 Mpa, is the rock more likely to fail by slip on a pre-existing fracture or by brittle failure of intact rock? How can you tell?

