

Homework Assignment 9 (Due Monday April 9, 2007).

1) Assume that a rock can be modeled as a Maxwell material. A series of tests on identical rock specimens were performed such that in each experiment the strain rate was held constant. Sketch a family of stress-strain curves for three cases applicable to experiments with different strain rates: very slow, moderate and very fast. Discuss the implications of the results from a practical point of view.

2) Conventional triaxial tests ($\sigma_1, \sigma_2=\sigma_3$) were conducted on cylindrical specimens of Indiana limestone. The test results are reported in the following table.

σ_1 (psi)	$\sigma_2=\sigma_3$ (psi)
7000	250
7500	400
8500	500
9700	1000
10300	1000
11600	2000
13400	2000
13700	2000
15000	3000
15000	3000

Direct tension tests gave a tensile strength $T_0=500$ psi. Discuss the applicability of the following criteria to model the rock strength:

- (a) Two-parameter Mohr-Coulomb criterion;
- (b) Three-parameter Mohr-Coulomb criterion;
- (c) Hoek and Brown criterion.