

Advanced Rock Mechanics – Elasticity for fluid-saturated porous media

Semester 1, 2009

Homework #1 (2 March)

1. Calculation of transformed stress component *from* $\underline{\underline{\tau'}} = \underline{\underline{R}} \underline{\underline{\tau}} \underline{\underline{R}}^T$
2. Prove that determinant of stress is invariant.
3. Find principal stresses and their orientation with a given stress

$$\begin{pmatrix} 4 & 1 \\ 1 & 4 \end{pmatrix}$$

Use two methods (transformation equation and eigenvalue method) to find the solution.

4. Make an excel file which allows us to calculate principal stresses and their orientations with a given stress matrix in 3D

- Due by 6 March (Q 1 – 3, must be handwritten) and 13 March (Q 4, can be submitted through email).
- Interactions with peers are recommended.
- The excel sheet must be very succinct and recognizable by other people. The file must contain a verification case.