459.731 Theory of Poroelasticity

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Assistant Professor, Energy Resources Engineering, Seoul National University

Assignment #7 (19 April)

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1.

We have shales and Gneiss which are characterized to behave as transversely isotropic material. The elastic constants for this rock is as follows.

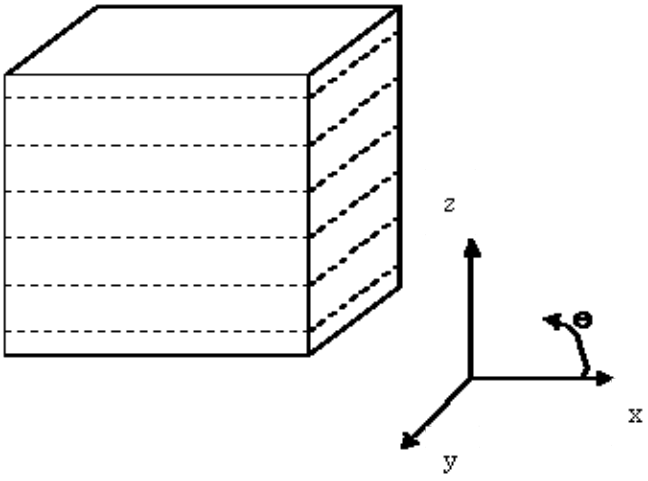
Shale

$$E_x = E_y = E_1 = 20GPa$$
$$E_z = E_3 = 10GPa$$
$$\nu_{xy} = \nu_{yx} = \nu_1 = 0.25$$
$$\nu_{zy} = \nu_{zx} = \nu_2 = 0.15$$
$$G_{xy} = G_{yx} = 8GPa$$
$$G_2 = 4GPa$$

Gneiss

$$E_x = E_y = E_1 = 50GPa$$
$$E_z = E_3 = 40GPa$$
$$\nu_{xy} = \nu_{yx} = \nu_1 = 0.20$$
$$\nu_{zy} = \nu_{zx} = \nu_2 = 0.18$$
$$G_{xy} = G_{yx} = 20.83GPa$$
$$G_2 = 20GPa$$

Calculate the apparent vertical and horizontal Elastic modulus and Poisson's ratios with the rotation about y-axis.



2.

Calculate the bounds of elastic constants for the transversely isotropic rock.