بسمه تعالی

Flow of Fluids through Porous Media

HW # 4

Due 1398.09.02

1. Consider a horizontal isotropic stratum of uniform thickness and infinite in areal extent. The stratum is composed of two parts separated by a vertical plane, one part having permeability K_a and the other having permeability K_b. The stratum is supposed filled with an incompressible fluid of density ρ and viscosity μ. Two wells of strengths q_1 and q_2 represented by point sources, are supposed located in medium b at distances d_1 and d_2 from the discontinuity. Obtain the potential distribution in both medium.

2. Show that for a single well in a uniform plane anisotropic stratum the curves of equal potential in the plane are confocal ellipses with ration of major to minor axes given by K_1/K_2 , where K_1 is permeability along major axis and K_2 is permeability along minor axis.

3. Show that a plane point source in an anisotropic media is represented by

$$\psi' = \frac{q\mu}{4\pi h\sqrt{K_1 K_2}} ln\left[(x_1 - a)^2 + \frac{K_1}{K_2}(x_2 - b)^2\right] + c$$