HW#8

Assigned: Friday, October 23, 2009

Due: Tuesday, November 3, 2009

    a) Write out the finite difference expansion of the 1D pressure equation. Use the total transmissibility definition to simplify the equations. Collect terms for P_i^{n+1} and $P_{i\pm1}^{n+1}$. Collect all other terms and move to the right hand side of the equation.

    b) For a 5-node problem, write out the equations for each node using the collected form from (a).

Pressure: $0.006328\dfrac{\partial}{\partial x}k\left(\lambda_T^n\dfrac{\partial P_o^{n+1}}{\partial x}-(\lambda_w^n\gamma_w^n+\lambda_o^n\gamma_o^n)\dfrac{\partial D}{\partial x}-\lambda_w\dfrac{\partial P_{cwo}^n}{\partial x}\right)+\hat{q}_T^n=\phi C_T\dfrac{\partial P_o}{\partial t}$

Total Transmissibility: $T_{Tx,i\pm\frac{1}{2}}^n=0.006328\left(\dfrac{k\lambda_T^n}{\Delta x}\right)_{i\pm\frac{1}{2}}(\Delta y\Delta z)_i$

Water Transmissibility: $T_{wx,i\pm\frac{1}{2}}^n=0.006328\left(\dfrac{k\lambda_w^n}{\Delta x}\right)_{i\pm\frac{1}{2}}(\Delta y\Delta z)_i$