Governing Eqns. Cont. 2-11-20

flow in Confined aquifer ↙ darcy

Start from ① & ② again

Conservation of mass

$$S_s \cancel{b}\,\cancel{\Delta y}\,\cancel{\Delta x}\,\frac{dh}{dt} = \frac{d}{dx}\left(K\frac{dh}{dx}\right)\cancel{\Delta y}\,\cancel{\Delta x}\,\cancel{b}$$

ΔS ⟵ inflow − outflow ⟵ refer to last notes

$$S_s\frac{dh}{dt} = \frac{d}{dx}\left(K\frac{dh}{dx}\right)$$

$$\frac{S_s}{K}\frac{dh}{dt} = \frac{d^2h}{dx^2}$$

Transmissivity: $T = Kb$

$[L^2/T] = [L][L]$

The volume of water moving through a unit width of an aquifer under a unit gradient

$S = bS_s \qquad T = Kb \Rightarrow \frac{S_s}{K} = \frac{S}{T}$

$$\frac{S}{T}\frac{dh}{dt} = \frac{d^2h}{dx^2} + \frac{R}{T}$$

$$\frac{S}{T}\frac{dh}{dt} = \frac{d^2h}{dx^2} + \frac{d^2h}{dy^2} + \frac{d^2h}{dz^2} + \frac{R}{T}$$

Conf. vs. Unconf. layers in MF-

- By default layer are convertible
- Convertible layers are confined if head > thickness of layer and unconfined if not
- If you set layer to confined then the transmissivity will always use the layer thickness & it won't check if it becomes unconfined