

Chapter 4 GW & Well Hydraulics

→ Fundamental eq.

→ Storage coefficient, transmissivities ← pumping test.

→ Futures declines in GW level

Steady / unsteady, several special B-C.

4.1 Steady unidirectional Flow

a) confined

$$\frac{\partial^2 h}{\partial y^2} = 0$$

Fig 4.2.1

$$h = Gx + C2$$

assures $h = 0$ where $x = 0$

$$\frac{\partial h}{\partial x} = -(V / K) \text{ from Darcy law}$$

$$\therefore h = -\frac{Vx}{K}$$

b) unconfined

Fig. 4.2.2

$$q = -Kh \frac{\partial h}{\partial x}$$

$$qx = -\frac{K}{2} h^2 + C$$

$$\text{if } h : h_0, x = 0 \quad q = \frac{K}{2x} (h_0^2 - h^2)$$

For two fixed bodies
(h_0, h_1)

$$\frac{dh}{dx} = \frac{q}{Kh_0}$$

c) Base flow

$$Q_b = 2a \bar{W}$$

$$h^2 = h_a^2 + \frac{W}{K} (a^2 - x^2)$$

$$\text{known } h \rightarrow w \rightarrow Q_b$$

Sample 4.1.3