Chapter 3 - Principles of GW Flow

Wells located at $x,y = (0,0), (15,20)$ and $(10,10)$

$$h = 15, 140, 85$$

Assume confined aquifer $\Rightarrow h = Ax + By + C$

Well 1 $\Rightarrow$ $15 = 0 + 0 + C$ $\Rightarrow C = 15$

2 $\Rightarrow$ $140 = 15A + 20B + C$

3 $\Rightarrow$ $85 = 10A + 10B + C$

$\therefore$ $15A + 20B = 125$ (I)

$10A + 10B = 70$ (II)

$2(II) - (I) \Rightarrow$ $5A = 15 \Rightarrow A = 3$

$(II) \Rightarrow$ $30 + 10B = 70 \Rightarrow B = 4$

$\therefore$ [illegible]

$$\boxed{h = 3x + 4y + 15}$$

↳ Check Well 1 $15 = 15$ ✓

2 $140 = 45 + 80 + 15$

$= 140$ ✓

3 $85 = 30 + 40 + 15$

$= 85$ ✓

Unconfined $\Rightarrow h^2 = Ax + By + C$

$\therefore \quad 15^2 = 0 + 0 + C \quad \Rightarrow \quad C = 15^2 = 225$

$(140)^2 = 15A + 20B + C$

$85^2 = 10A + 10B + C$

$\therefore \quad 15A + 20B = 140^2 - 15^2 \quad (I)$

$10A + 10B = 85^2 - 15^2 \quad (II)$

$2(II) - (I) \Rightarrow \quad 5A = 2(85^2 - 15^2) - (140^2 - 15^2)$

$$A = -1075$$

$(II) \Rightarrow \quad 10B = 85^2 - 15^2 - 10A = 17750$

$$B = 1775$$

$\therefore \quad h^2 = -1075x + 1775y + 225$

Check Well 1 $\quad 15^2 = 15^2$ ✓

2 $\quad 140^2 = 15(-1075) + 20(1775) + 225$

$19600 = 19600$ ✓

3 $\quad 85^2 = 10(-1075) + 10(1775) + 225$

$7225 = 7225$ ✓