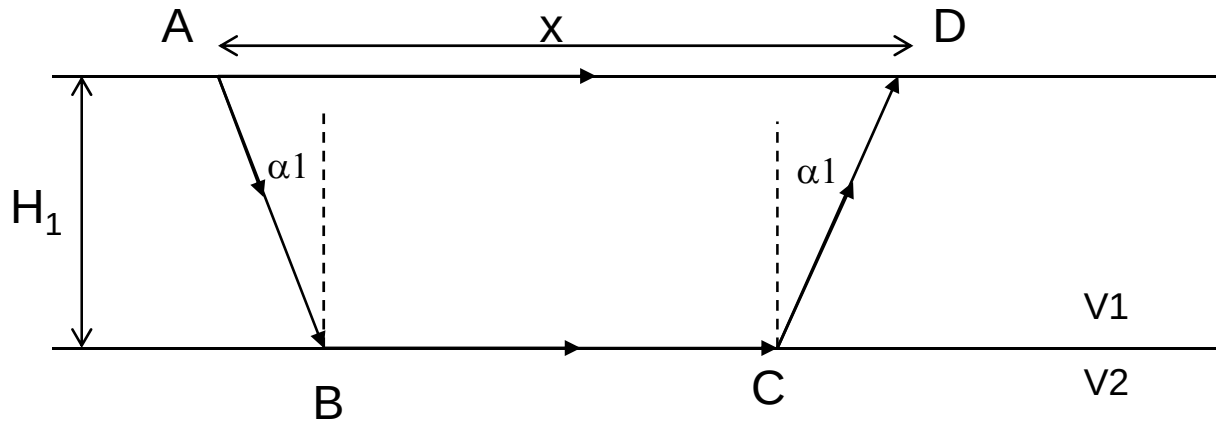
Refracción Sísmica

2 Estratos Horizontales



$$t_{AD} = 2t_{AB} + t_{BC}$$

$$t_{AB} = \frac{AB}{V_1} = \frac{H_1}{V_1 \cos \alpha 1}$$

$$t_{BC} = \frac{BC}{V_2} = \frac{X - 2H_1 \tan \alpha 1}{V_2}$$

Ley de Snell

$$\frac{sen\alpha 1}{V_1} = \frac{sen\alpha 2}{V_2}$$

$$\alpha 2 = 90^o \Rightarrow sen\alpha 2 = 1$$

$$\Rightarrow sen\alpha 1 = \frac{V_1}{V_2}$$

$$\cos \alpha 1 = \sqrt{1 - \left(V_1 / V_2 \right)^2} = \frac{\sqrt{V_2^{\,2} - V_1^{\,2}}}{V_2}$$

$$\tan \alpha 1 = \frac{V_1}{\sqrt{V_2^{\,2} - V_1^{\,2}}}$$

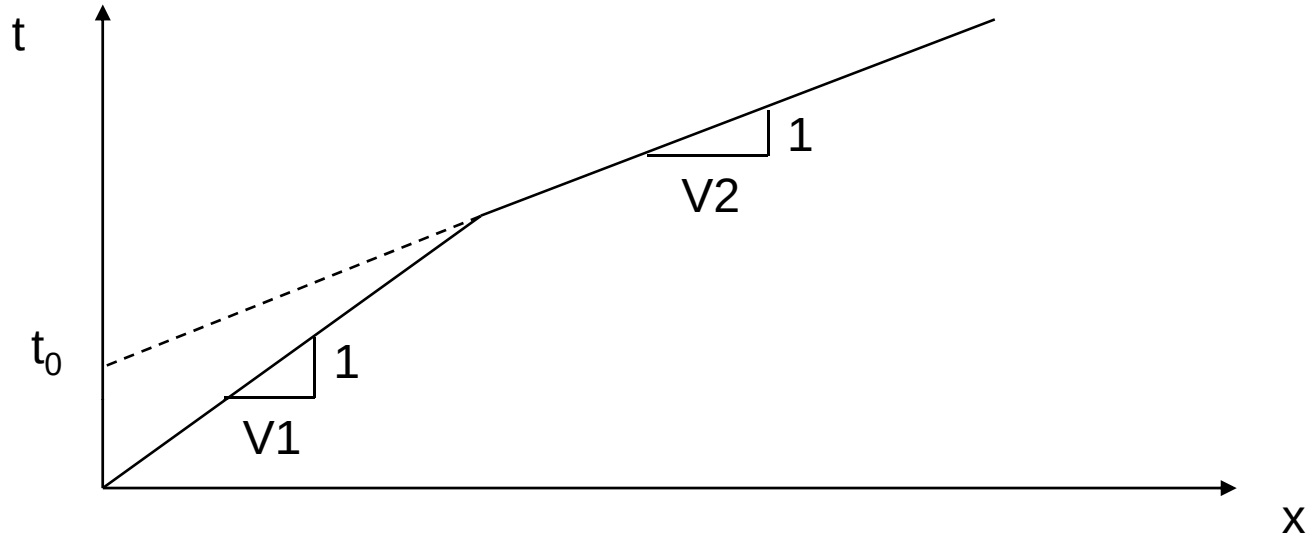
$$t_{AB} = \frac{H_1 V_2}{V_1 \sqrt{V_2^{\,2} - V_1^{\,2}}}$$

$$t_{BC} = \frac{X}{V_2} - \frac{2H_1 V_1}{V_2 \sqrt{V_2^{\,2} - V_1^{\,2}}}$$

$$t_{AD} = \frac{2H_1 V_2}{V_1 \sqrt{V_2^{\,2} - V_1^{\,2}}} + \frac{X}{V_2} - \frac{2H_1 V_1}{V_2 \sqrt{V_2^{\,2} - V_1^{\,2}}} = \frac{X}{V_2} + \frac{2H_1 \sqrt{V_2^{\,2} - V_1^{\,2}}}{V_1 V_2}$$

$$t_{AD} = \frac{X}{V_2} + \frac{2H_1 \cos \alpha 1}{V_1}$$

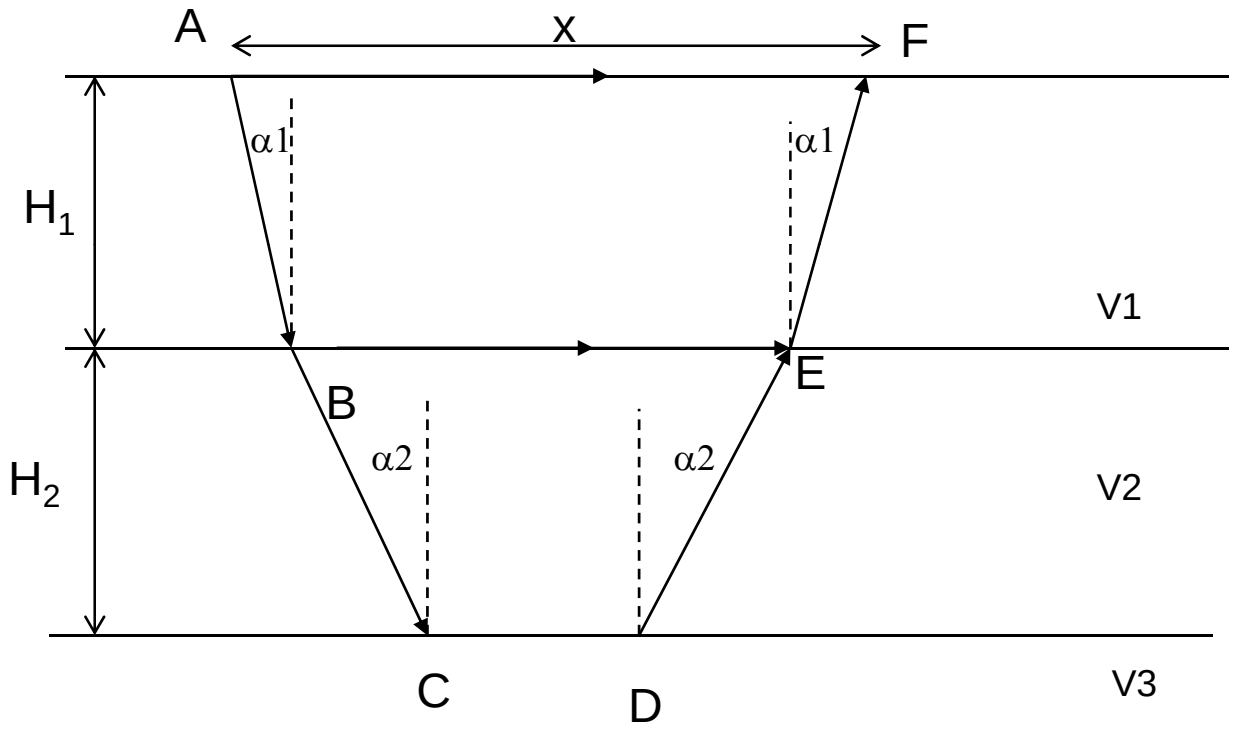
Curva Camino-tiempo generada por ensayo de refracción



$$t_0 = \frac{2H_1\sqrt{V_2^{\,2} - V_1^{\,2}}}{V_1 V_2} \Rightarrow H_1 = \frac{t_0 V_1 V_2}{2\sqrt{V_2^{\,2} - V_1^{\,2}}}$$

Refracción Sísmica

3 Estratos Horizontales



$$t_{AF} = 2t_{AB} + 2t_{BC} + t_{CD}$$

$$t_{AB} = \frac{AB}{V_1} = \frac{H_1}{V_1 \cos \alpha 1}$$

$$t_{BC} = \frac{BC}{V_2} = \frac{H_2}{V_2 \cos \alpha 2}$$

$$t_{CD} = \frac{CD}{V_3} = \frac{X - 2H_1 \tan \alpha 1 - 2H_2 \tan \alpha 2}{V_3}$$

Ley de Snell

$$\frac{sen\alpha 1}{V_1} = \frac{sen\alpha 2}{V_2} = \frac{sen\alpha 3}{V_3} = \frac{1}{V_3}$$

$$\alpha 2 = 90^o \Rightarrow sen\alpha 2 = 1$$

$$\cos\alpha 1 = \sqrt{1 - \left(V_1 / V_3\right)^2} = \frac{\sqrt{V_3^{\,2} - V_1^{\,2}}}{V_3}$$

$$\tan\alpha 1 = \frac{V_1}{\sqrt{V_3^{\,2} - V_1^{\,2}}}$$

$$\cos\alpha 2 = \sqrt{1 - \left(V_2 / V_3\right)^2} = \frac{\sqrt{V_3^{\,2} - V_2^{\,2}}}{V_3}$$

$$\tan\alpha 1 = \frac{V_2}{\sqrt{V_3^{\,2} - V_2^{\,2}}}$$

Finalmente

$$t_{AF} = \frac{2H_1\sqrt{V_3^{\,2} - V_1^{\,2}}}{V_1 V_3} + \frac{2H_2\sqrt{V_3^{\,2} - V_2^{\,2}}}{V_2 V_3} + \frac{X}{V_3}$$

Curva Camino-tiempo generada por ensayo de refracción