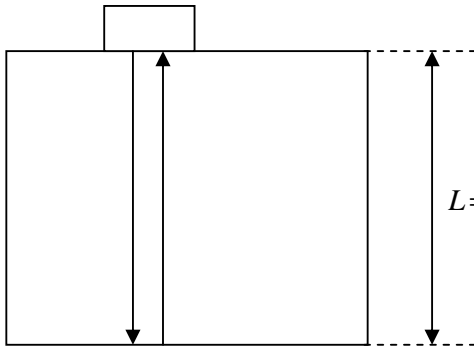


سری چهارم

(۲)



$$\alpha = 100 \text{ dB/m}$$

$$L = 5'' = 127 \text{ mm}$$

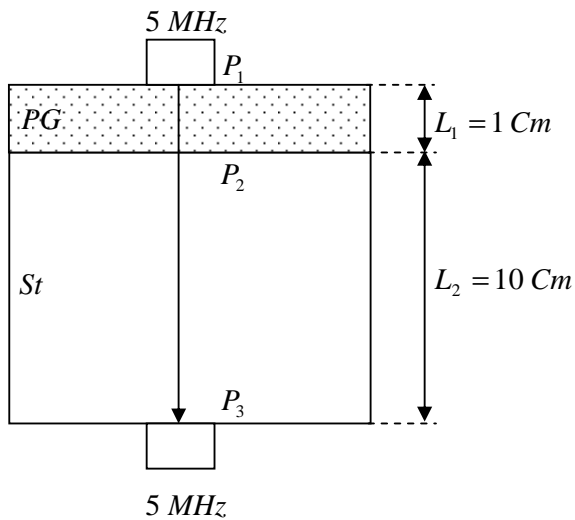
پژواک دوم  $2L$  بیشتر از پژواک اول طی کرده است یعنی:

$$\alpha(2L) = 20 \text{Log} \frac{P_1}{P_2}$$

$$\frac{P_1}{P_2} = 10^{(\alpha(2L)/20)} = 10^{(100(2 \times 127 \times 10^{-3})/20)} = 18.6$$

$$P_2 = \frac{1}{18.6} P_1 \rightarrow P_2 = 0.05 P_1 \Rightarrow \frac{P_2}{P_1} = 5\%$$

(۳)



$$\alpha L = 20 \text{Log} \frac{P_1}{P_2}$$

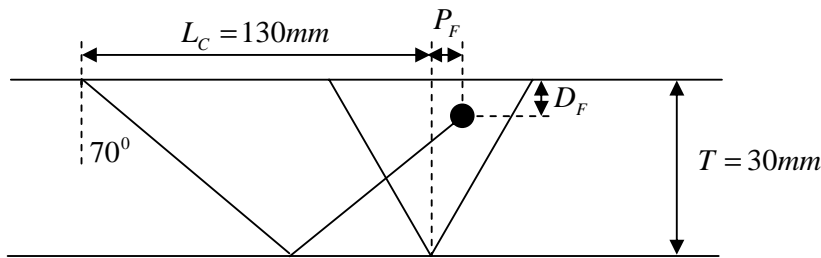
$$\alpha_{PG} L_1 = 20 \text{Log} \frac{P_1}{P_2} \rightarrow 10^{\left(\frac{\alpha_{PG} L_1}{20}\right)} = \frac{P_1}{P_2}$$

$$\alpha_{St} L_2 = 20 \text{Log} \frac{P_2}{P_3} \rightarrow 10^{\left(\frac{\alpha_{St} L_2}{20}\right)} = \frac{P_2}{P_3}$$

$$\frac{P_1}{P_2} \times \frac{P_2}{P_3} = \frac{P_1}{P_3} = 10^{\left(\frac{\alpha_{PG} L_1}{20}\right)} \times 10^{\left(\frac{\alpha_{St} L_2}{20}\right)} = 10^{\left(\frac{320 \times 1 \times 10^{-2}}{20}\right)} \times 10^{\left(\frac{90 \times 0.1}{20}\right)} = 4.07$$

$$\frac{P_3}{P_1} = \frac{1}{4.07} = 0.245 \text{ or } 24.6\%$$

سری ششم



(۱)

$$BPL = 152 \text{mm}$$

$$L_H = BPL \times \sin \theta = 152 \times \sin 70^\circ = 142.8 \text{mm}$$

$$L_V = BPL \times \cos \theta = 152 \times \cos 70^\circ = 52 \text{mm}$$

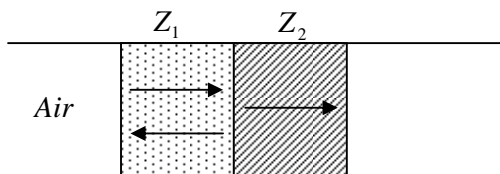
$$D_F = 2T - L_V = 2(30) - 52 = 8 \text{mm}$$

$$P_F = L_H - L_C = 142.8 - 130 = 12.8 \text{mm}$$

(۱-۷)

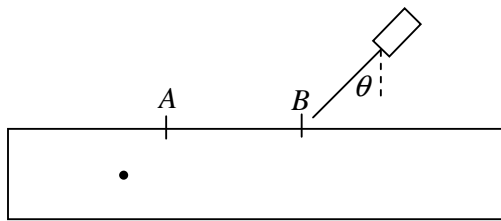
$$PZT : Z_1 = 33 \times 10^6 \text{ Kg/m}^2 \text{ s}$$

$$\text{Plexiglass} : Z_2 = 4.3 \times 10^6 \text{ Kg/m}^2 \text{ s}$$



$$R = \frac{Z_2 - Z_1}{Z_1 + Z_2}$$

$$T = \frac{2Z_2}{Z_1 + Z_2}$$



(۱-۸)

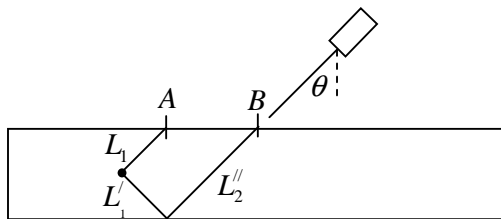
$$\theta = 18.8^\circ$$

جدول ۱-۵ صفحه ۵۹

$$C_w = 1483 \text{ m/s}$$

$$(C_t)_{\text{Steel}} = 3230 \text{ m/s}$$

$$\frac{\sin \theta}{\sin \theta'} = \frac{1483}{3230} \rightarrow \sin \theta' = \sin \theta \frac{3230}{1483} = 0.702 \rightarrow \theta' = 44.5^\circ$$



با فرض اینکه عیب در وسط قطعه باشد:

$$L_1 = \frac{105/2}{\cos 44.5} = 74.25 \text{ mm}$$

$$L_2 = L_1' + L_2'' = 3L_1 = 222.75 \text{ mm}$$

$$t_1 = \frac{2L_1}{(C_t)_{st}} = \frac{2 \times 74.25 \times 10^{-3}}{3230} = 46 \text{ ms}$$

$$t_2 = 3t_1 = 138 \text{ ms}$$

$$t_2 - t_1 = 138 - 46 = 92 \text{ ms}$$

Echo at "B" 92ms after echo coming from "A"

$$\alpha L = 20 \text{Log} \frac{A_1}{A_2} \rightarrow \frac{\alpha L}{20} = \text{Log} \frac{A_1}{A_2}$$

$$\frac{A_1}{A_2} = 10^{\alpha L / 20} = 10^{90(74.25 \times 10^{-3}) / 20} = 2.158$$

$$\frac{B_1}{B_2} = 10^{\alpha L / 20} = 10^{90(222.75 \times 10^{-3}) / 20} = 10.05$$

$$\text{Since } A_1 = B_1 \rightarrow \frac{\frac{A_1}{A_2}}{\frac{B_1}{B_2}} = \frac{B_2}{B_1} = \frac{2.158}{10.05} = 0.21$$

(F-A)

First check First echo :

$$t \approx 25.2 \text{ } \mu\text{s} \quad 2L = 5900(25.2 \times 10^{-6}) = 0.15\text{m} = 150\text{mm} \rightarrow L = 75\text{mm}$$

Now check second echo :

$$t \approx 34.2 \text{ } \mu\text{s} \quad 2L = 5900(34.2 \times 10^{-6}) = 201\text{mm} \rightarrow L = 100.5\text{mm}$$

Check 3rd echo :

$$t \approx 41.4 \text{ } \mu\text{s} \quad 2L = 5900(41.4 \times 10^{-6}) = 244\text{mm} \rightarrow L = 122\text{mm}$$

$\Rightarrow$  Position is "H"