

16장 파동의 운동

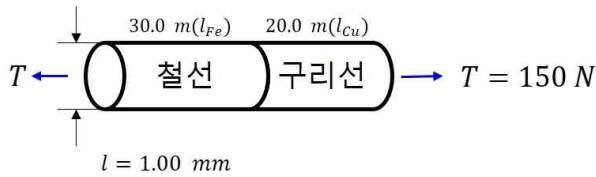
1. $\Delta t = 17.3 \text{ s}$, $v_s = 4.50 \text{ km/s}$, $v_p = 7.80 \text{ km/s}$

지진 기록계로부터 진원지까지의 거리를 d 라 하면,

$$\Delta t = \frac{d}{v_s} - \frac{d}{v_p} = d \left(\frac{1}{v_s} - \frac{1}{v_p} \right)$$

$$d = \frac{\Delta t}{\frac{1}{v_s} - \frac{1}{v_p}} = 184 \text{ km}$$

14.



밀도: $\rho_{Fe} = 7.874 \text{ g/cm}^3$, $\rho_{Cu} = 8.920 \text{ g/cm}^3$

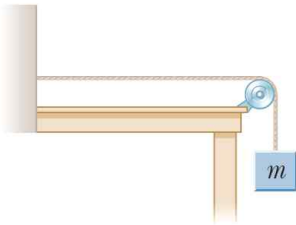
$$\mu_{Fe} = \rho_{Fe} \cdot \pi \left(\frac{1}{2} l \right)^2 \rightarrow v_{Fe} = \sqrt{\frac{T}{\mu_{Fe}}}$$

$$\mu_{Cu} = \rho_{Cu} \cdot \pi \left(\frac{1}{2} l \right)^2 \rightarrow v_{Cu} = \sqrt{\frac{T}{\mu_{Cu}}}$$

전체 길이를 파가 진행하는데 걸리는 시간 t 는,

$$t = t_{Fe} + t_{Cu} = \frac{l_{Fe}}{v_{Fe}} + \frac{l_{Cu}}{v_{Cu}} = l_{Fe} \sqrt{\frac{\mu_{Fe}}{T}} + l_{Cu} \sqrt{\frac{\mu_{Cu}}{T}} = \frac{l_{Fe} \sqrt{\mu_{Fe}} + l_{Cu} \sqrt{\mu_{Cu}}}{\sqrt{T}} = 0.329 \text{ s}$$

15.



(a) $F = mg = (3.00 \text{ kg})(9.80 \text{ m/s}^2) = 29.4 \text{ N}$

줄의 단위 길이당 질량 = 선밀도(μ)

$$v = \sqrt{\frac{F}{\mu}} \rightarrow \mu = \frac{F}{v^2} = \frac{29.4 \text{ N}}{(24.0 \text{ m/s})^2} = 0.0510 \text{ kg/m}$$

(b) $m = 2.00 \text{ kg}$ 이라면,

$$F = mg = (2.00 \text{ kg})(9.80 \text{ m/s}^2) = 19.6 \text{ N}$$

$$v = \sqrt{\frac{F}{\mu}} = \sqrt{\frac{19.6 \text{ N}}{0.0510 \text{ kg/m}}} = 19.6 \text{ m/s}$$