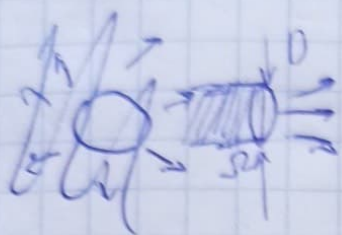


2/8.
No 1.6



$$D = 10^{-1} \text{ m}$$

$$N = 0,2 \text{ Bt}$$

$$f = 600 \text{ THz}$$

$$h_1 = 0,02 \text{ m (iron)}$$

$$h_2 = 0,1 \text{ m (copper)}$$

$$z_{\text{beg}} = 1,45 \cdot 10^6 \text{ cm}$$

$$z_{\text{bezg}} = 0,43 \cdot 10^3 \text{ cm}$$

$$\omega = 2\pi f$$

$$N = \langle S \rangle \cdot |Z|$$

$$\langle S \rangle = \frac{p_m^2}{2\rho c} = \frac{1}{2} \rho c v_m^2, \quad \rho c = Z$$

$$\Rightarrow p_m = \sqrt{2Z\langle S \rangle}, \quad v_m = \sqrt{\frac{2\langle S \rangle}{Z}}$$

$$\frac{p_m}{v_m} = Z$$

$$1) A = \omega \rho g \frac{I}{I_0} \neq N = \int_S S \, ds$$

$$\Rightarrow S = \frac{I}{\pi D^2/4} \neq I_0$$

$$\vec{S} = p \vec{v} \neq I = \langle S \rangle_T = p_m v_m \langle \cos^2 \omega t \rangle_T = \frac{1}{2} p_m v_m = N$$

$$1) A = 10 \lg \frac{I}{I_0} = 10 \lg \frac{N}{|S| \cdot I_0}$$

$$|S| = \frac{1}{4} \pi D^2 = \frac{\pi}{400} \text{ м}^2, \quad I = \frac{N}{|S|} = \frac{0,2 \text{ Вт}}{\frac{\pi}{400} \text{ м}^2} = 255 \frac{\text{Вт}}{\text{м}^2}$$

$$A = 10 \lg \frac{0,2 \text{ Вт} \cdot 400 \cdot \text{м}^2}{\pi \text{ м}^2 \cdot 10^{-12} \text{ Вт}} = 10 \lg \left(\frac{2}{\pi} \cdot 10^{13} \right) = \underline{\underline{134,06 \text{ дБ}}}$$

2) X - ампл. смещения

v - ампл. скорости

a - ампл. ускорения

$$x = X e^{i(\omega t + \psi)}$$

$$v = \dot{x} = \omega X e^{i(\omega t + \psi)}$$

$$a = \ddot{x} = \omega^2 X e^{i(\omega t + \psi)}$$

$$\Rightarrow X = \frac{v}{\omega}, \quad a = v \cdot \omega$$

$$v = \sqrt{\frac{2N}{2|S|}} = \sqrt{\frac{2 \cdot 0,2 \text{ Вт} \cdot 400}{2 \cdot \pi \cdot \text{м}^2}}$$

$$\omega = 2\pi f = 3,77 \text{ кГц}$$

$$\Rightarrow X_{\text{всг}} = \sqrt{\frac{160}{\pi \cdot 0,43 \cdot 10^3}} = 1,57 \cdot 10^{-6} \text{ м} = 9,13 \cdot 10^{-5} \text{ м}$$

$$X_{\text{всг}} = 1,57 \cdot 10^{-6}$$

$$v_{\text{всг}} = 5 \cdot 10^{-3} \frac{\text{м}}{\text{с}}$$

$$a_{\text{всг}} = 1297,5 \text{ м/с}^2$$

$$v_{\text{всг}} = 344 \cdot 10^{-3} \frac{\text{м}}{\text{с}}$$

$$a_{\text{всг}} = 22,34 \text{ м/с}^2$$

3) $h = h_1$ плоская волна

$$p(x, t) = \operatorname{Re}(p_0 e^{i(\omega t - kx + \varphi_0)}) = \operatorname{Re}(p_0$$

$$x = h_1 \Rightarrow p_m = p_0$$

$$\text{ампл. } p_0 = \sqrt{2Z \frac{N}{|S|}} = \sqrt{\frac{2ZN}{\frac{1}{4} D^2 \pi}} =$$

$$= 7,1365 \cdot \sqrt{\frac{8 \cdot \text{Вт}}{\text{м}^2}} \Rightarrow p_{m \text{ вог}} = 8,6 \cdot 10^3 \text{ Па}$$

$$p_{m \text{ вог}} = 149 \text{ Па}$$

$h = h_2$ сфер. волна

$$p(x, t) = \operatorname{Re}\left(\frac{p_0 h_1}{x} e^{i(\omega t - kx + \varphi_0)}\right)$$

$$p = \frac{p_0 h_1}{x_0} e^{i(\omega t + (\varphi_0 - kx_0))}$$

phase

$$\Rightarrow \text{ампл. } p_m = \frac{p_0 h_1}{x_0} = \frac{p_0}{51} x_0 = 0,1 \text{ м}$$

$$p_{m \text{ вог}} = 1,72 \cdot 10^3 \text{ Па}$$

$$p_{m \text{ вог}} = 29,8 \text{ Па}$$