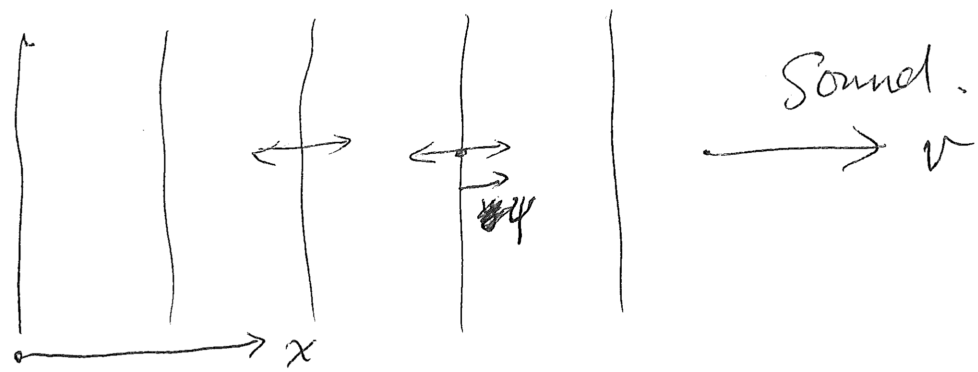
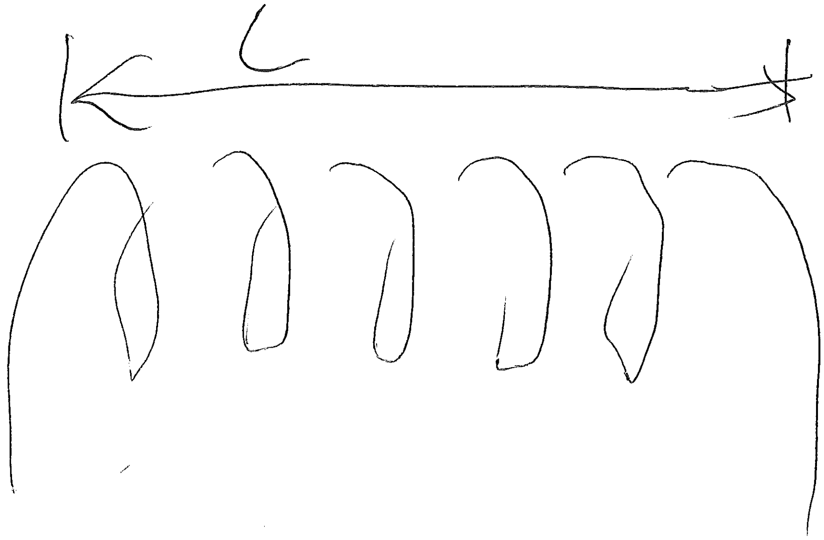
Wave propagation requires a medium



Classical wave equation $\longrightarrow$ $$\frac{\partial^2 \psi}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 \psi}{\partial t^2}.$$

speed of sound.



$$U = \frac{1}{2} L I^2$$

$$= \frac{1}{2}(\mu_0 n N A) I^2$$

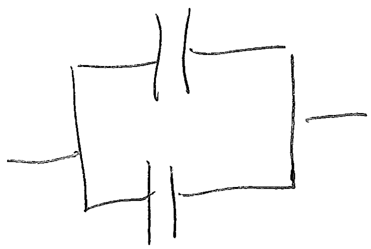
$$= \frac{1}{2} \mu_0 n \cdot (Ln) A I^2$$

$$= \frac{1}{2} \mu_0 (nI)^2 L A$$

$$= \frac{1}{2\mu_0} (\mu_0 n I)^2 L A$$

$$= \frac{1}{2\mu_0} B_1^2 \cdot L A \quad \leftarrow LA = V$$

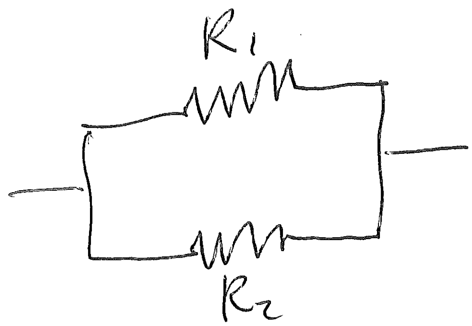
$$\Rightarrow \frac{U}{V} = \frac{1}{2\mu_0} B^2 \quad \text{or} \quad u = \frac{1}{2\mu_0} B^2$$



$$C_{eff} = C_1 + C_2$$

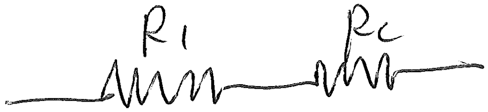
$$\boxed{C = QV}$$

$$\frac{1}{C_{eff}} = \frac{1}{C_1} + \frac{1}{C_2}.$$



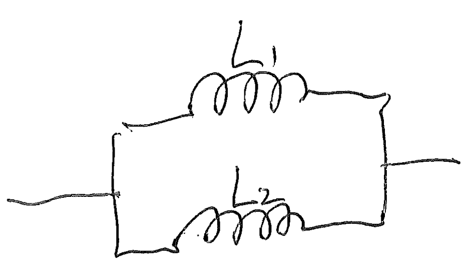
$$\frac{1}{R_{eff}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\boxed{V = IR}$$

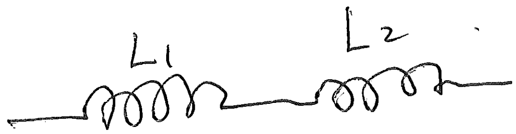


$$R_{eff} = R_1 + R_2.$$

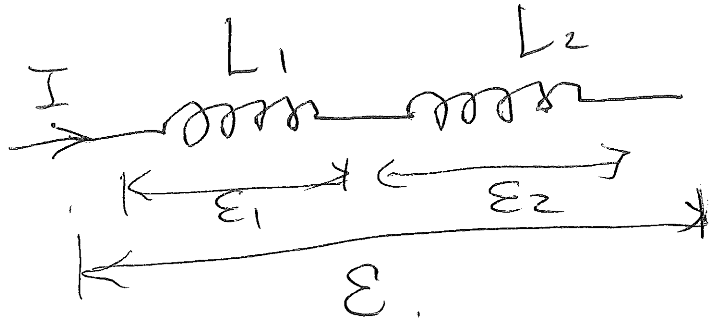
$$\overset{V}{\mathcal{E}} = -L\frac{dI}{dt}$$



$$\frac{1}{L_{eff}} = \frac{1}{L_1} + \frac{1}{L_2}.$$



$$L_{eff} = L_1 + L_2$$



$$\cancel{L =}\ \varepsilon = -L_{eff}\frac{dI}{dt}.$$

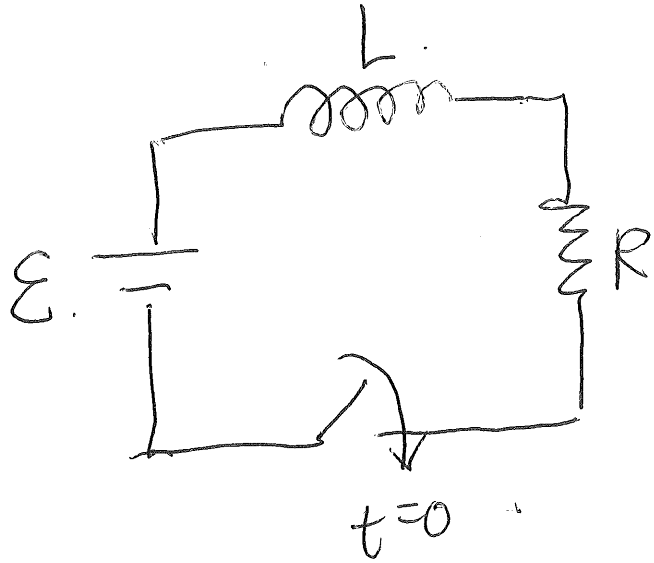
$$\varepsilon_1 = -L_1\frac{dI}{dt}$$

$$\varepsilon_2 = -L_2\frac{dI}{dt}.$$

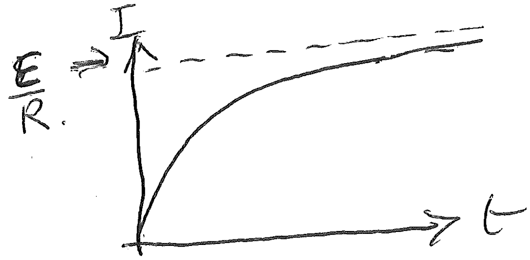
$$\varepsilon = \varepsilon_1 + \varepsilon_2.$$

$$-L_{eff}\frac{dI}{dt} = \left(-L_1\frac{dI}{dt}\right) + \left(-L_2\frac{dI}{dt}\right).$$

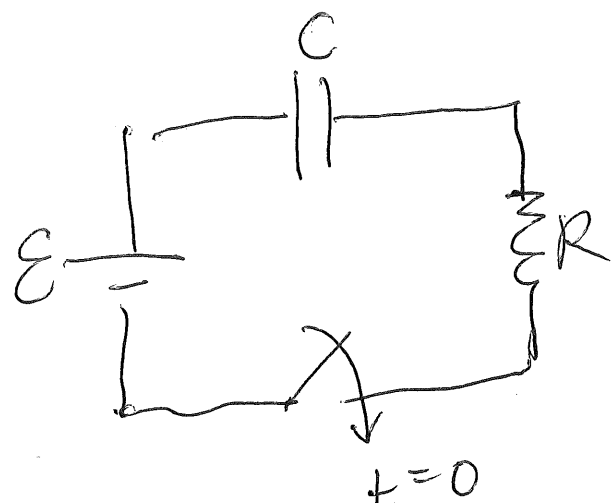
$$L_{eff} = L_1 + L_2.$$



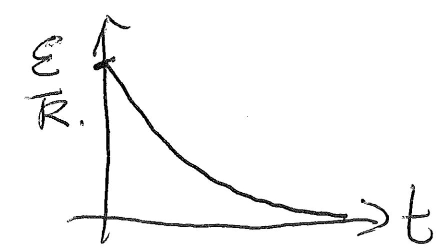
$I=0$ at $t=0$.

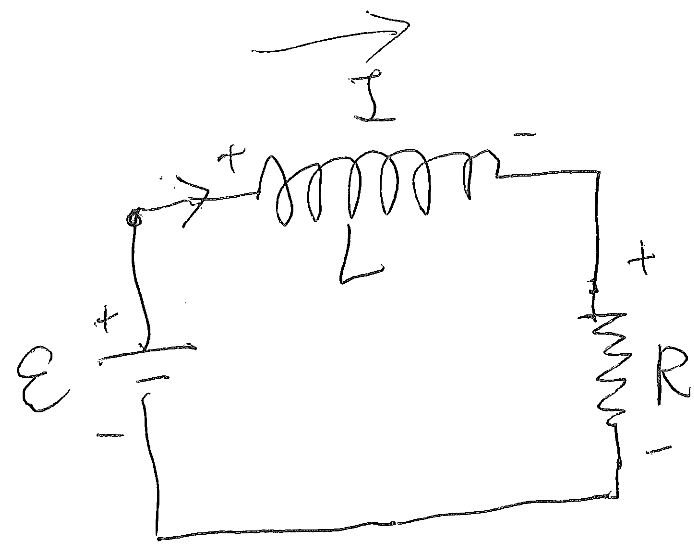


$\tau = \frac{L}{R}$. $\quad I = \frac{\varepsilon}{R}\left(1-e^{-t/\tau}\right)$.



$I = \frac{\varepsilon}{R}$ at $t=0$.





$$L\frac{dI}{dt} + IR - \mathcal{E} = 0.$$