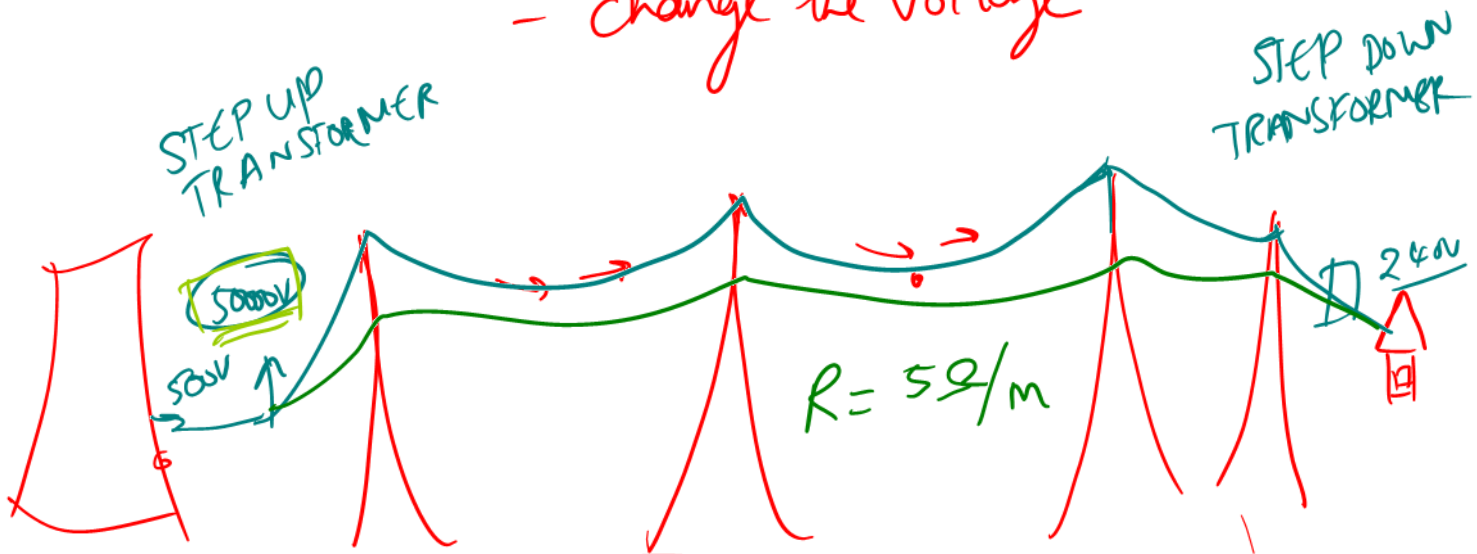


Transformers

- change the voltage



$$P_L = I^2 R$$

$$P_L = V_L I = I^2 R = \frac{V_L^2}{R}$$

$$P_L = I^2 R$$

reduce I

reduce R.

$$P = VI = IR(I) = I^2 R$$

$$V = IR$$

$$I = \frac{V}{R}$$

$$P = VI = V\left(\frac{V}{R}\right)$$

$$P = \frac{V^2}{R}$$

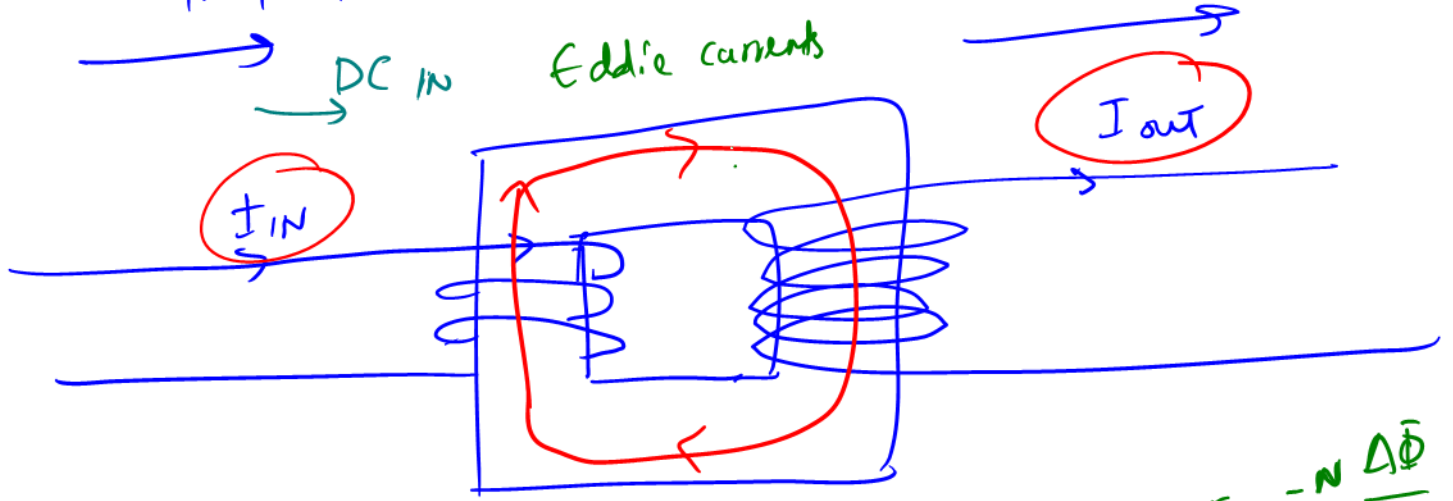
$$R = \frac{\rho l}{A}$$

↑
CSA

$$P = \uparrow VI \downarrow$$

INPUT

IDEAL TRANSFORMER OUTPUT



$$\mathcal{E}MF = -N \frac{\Delta \Phi}{\Delta t}$$

$$P_{IN} = P_{OUT}$$

$$V_{IN} I_{IN} = V_{OUT} I_{OUT}$$

$$\frac{V_{OUT}}{V_{IN}} = \frac{I_{IN}}{I_{OUT}}$$

$$P = VI$$

Primary coil
 N_{IN}

Secondary coil
 N_{OUT}

$$\frac{V_{OUT}}{V_{IN}} = \frac{N_{OUT}}{N_{IN}} = \frac{I_{IN}}{I_{OUT}}$$

change in I in primary coil induces a change in magnetic field strength. This then causes a Δ in flux through the secondary coil. This change in flux induces a voltage according to Faraday's law.

$$\mathcal{E}MF = -N \frac{\Delta \Phi}{\Delta t}$$

Does not work in DC current. No $\Delta I \rightarrow \Delta \Phi$
 $V_{OUT} = 0$

