

# Electromagnetic Fields

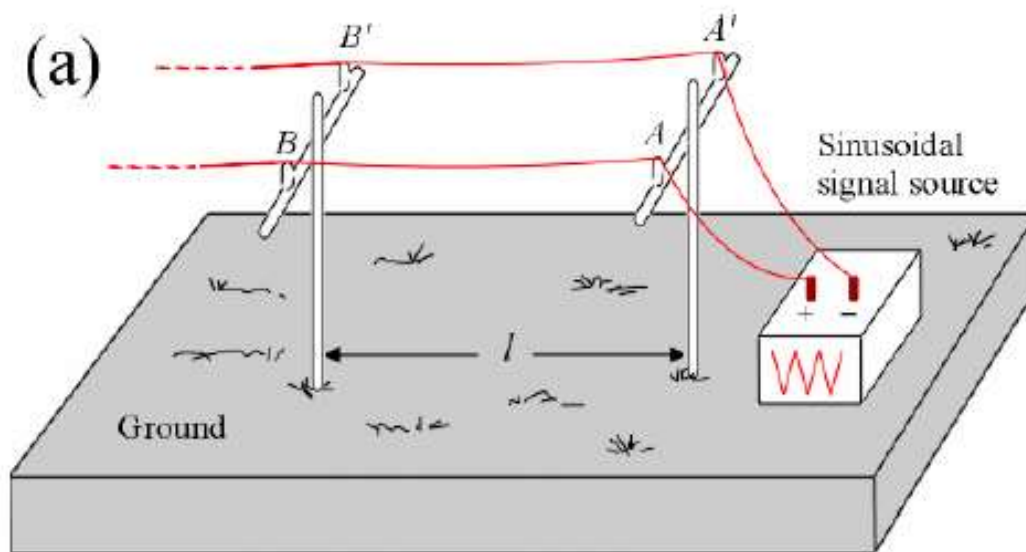
## – Assignment 01

# Introduction to EM fields

#	Student ID	Student Name	Grade (10)
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Q1

The power distributes grid of electric power via 60-Hz sinusoidal waves traveling in air (oscillating frequency 60 hz, refractive index  $n=0.85$  ). Calculate the min length of transmission line in order to apply distributed circuit analysis on it.



Sol 1

$$T = \frac{1}{60} \text{ sec}$$

$$td > 0.01 T$$

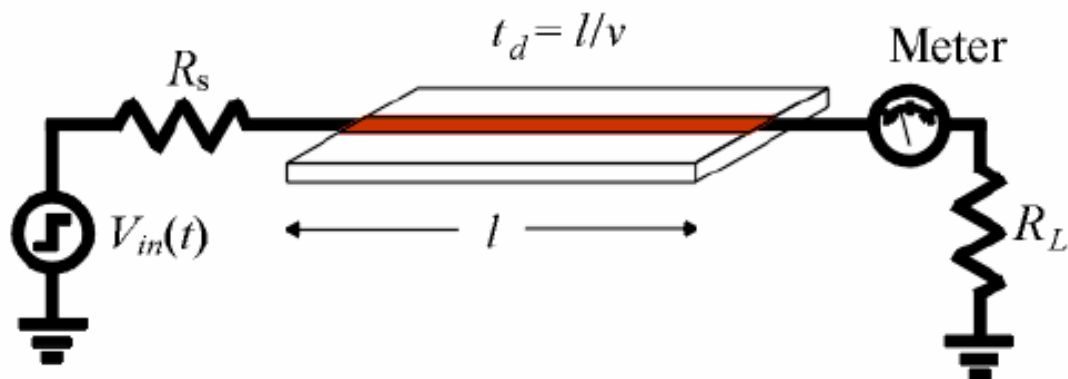
$$td = L/V$$

$$td > \frac{0.01}{60} = 1.67 \times 10^{-4} \text{ sec}$$

$$L = V \times td = 3 \times 10^8 \times 0.85 \times 1.67 \times 10^{-4} = 42.6 \text{ km}$$

Q2

Calculate the min max propagation delay inside transistor of  $\text{SiO}_2$ , having refractive index  $n=0.75$ , considering that total path length of signal through the transistor is 0.6 cm



Sol 2

$$V = 0.75 C$$

$$td = \frac{L}{V} = \frac{0.006}{0.75 \times 3 \times 10^8} = 2.67 \times 10^{-11} s = 26.7 Ps$$

$$tr < 2.5 td \cong 6.67 Ps$$