Physics 213a-2011 Class 35 Wednesday 11-30-11 Summary

Waves on transmission lines

Transmission line: A pair of conductors used to transmit a signal. The current in on one conductor equals the current out on the other.

Even straight wires have associated inductance.

$L_0 \equiv$ inductance per meter

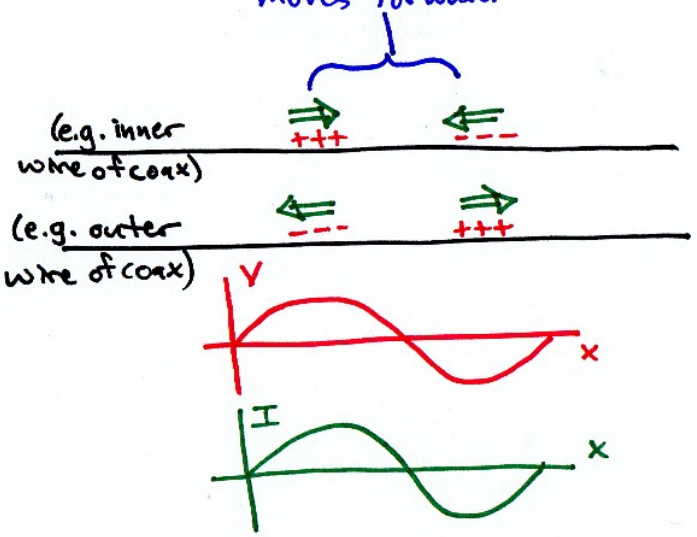
$C_0 \equiv$ Capacitance per meter (between the two conductors)

em waves		waves on transmission lines
E	isomorphic to	V
B		$L_0 I$
ε_0		C_0
μ_0		L_0

$\Rightarrow v_p = \frac{1}{\sqrt{L_0 C_0}}$ ($= 2_8$ m/s for standard coax)

$V = \sqrt{\frac{L_0}{C_0}}\, I \Rightarrow$ Current in the top wire is in phase w/ the voltage

You can see how the current flowing in here will charge up the capacitance, so that the voltage peak moves forward



Left-moving waves on transmission lines

→ I & V are 180° out of phase