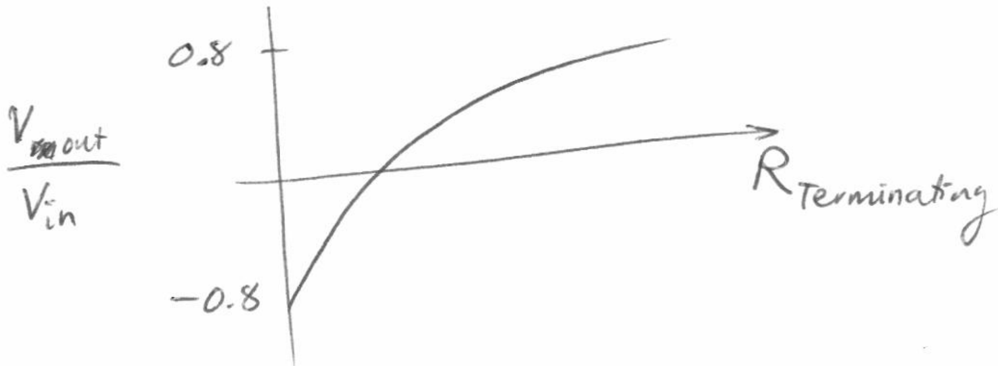
PH 424 DAY 5



One of my favorite parts of physics.
Good experimental data is telling us some fundamental aspects of the system.

* Qualitative surprises

① $\frac{V_{out}}{V_{in}}$ does not reach ±1.

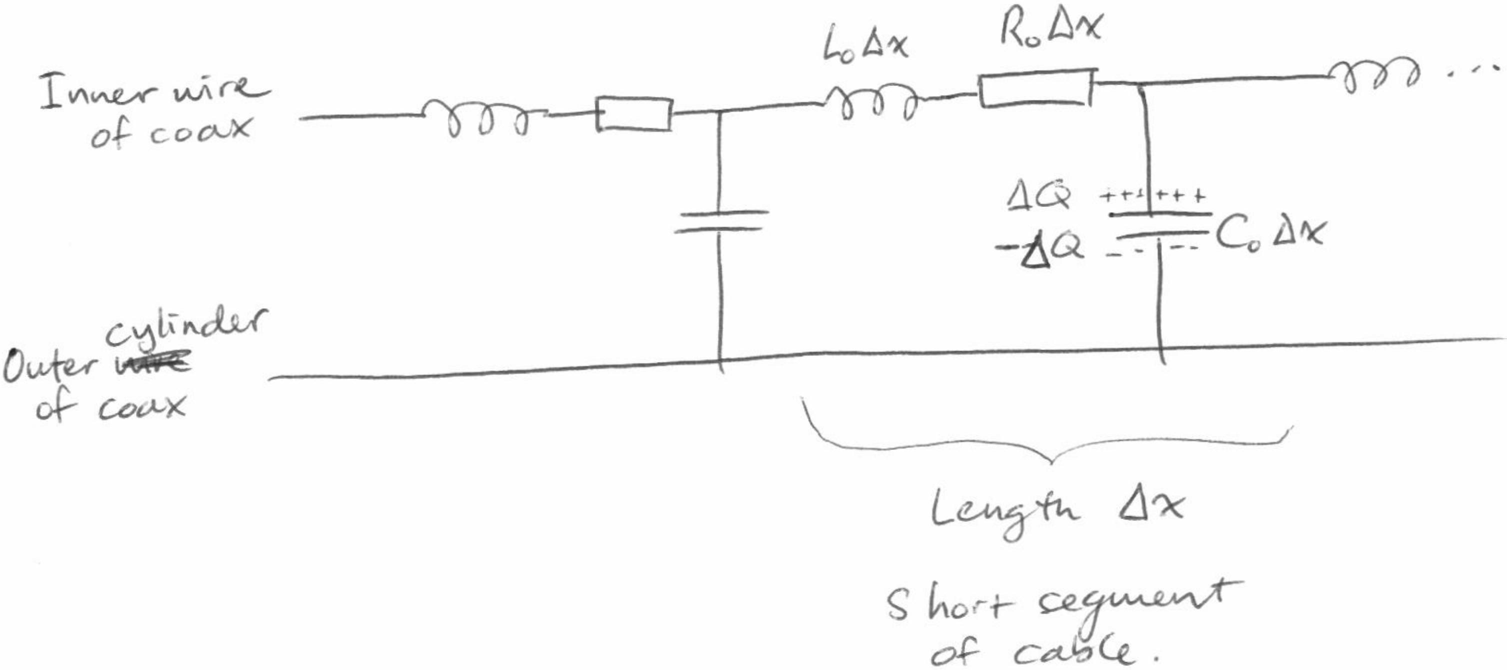
② Small impedence $R_{Terminal}$ flips the sign of the voltage pulse

* Quantitative puzzles

— What is the mathematical relationship between $\frac{V_{out}}{V_{in}}$ and $R_{Terminal}$?

CIRCUIT MODEL

$L_0 \equiv$ Inductance per unit length
$R_0 \equiv$ Resistance per unit length.
$C_0 \equiv$ Capacitance per unit length.



See Main 10.3 and links on class website Day 5.

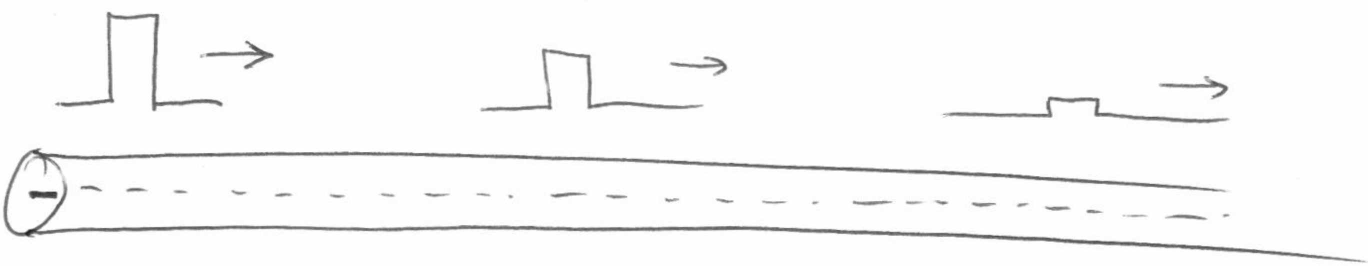
Charge ~~on the~~ build up in a short segment ~~on~~ is

$$\Delta Q = V(x,t)\, C_0 \Delta x$$

local voltage diff between inside wire and outside cylinder.

Wave eqn for V $\quad \dfrac{\partial^2 V(x,t)}{\partial x^2} = L_0 C_0 \dfrac{\partial^2 V(x,t)}{\partial t^2}$ [neglecting R_0]

R_0 leads to attenuation.
(Need to add R_0 into the wave eq^n).



(this is different from dispersion).

To make analogies with waves on stretched string, we'll have to show that $V(x,t)$ in a coax cable wave behaves like $\frac{\partial \psi}{\partial x}$ in a stretched string wave.

See HW #3.