

Phys 1402 2014-10-28

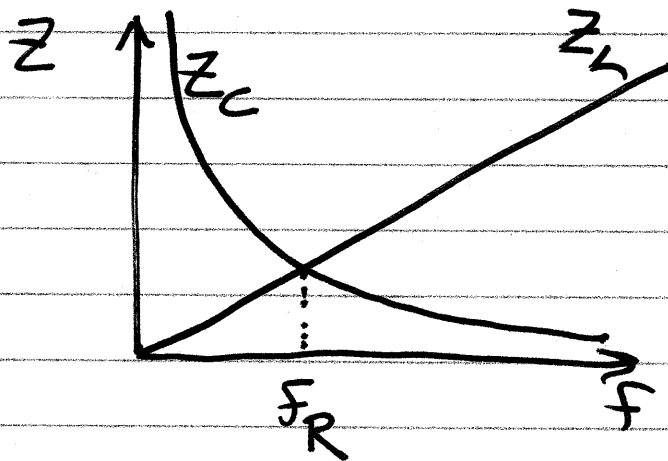
Exam 2 Thu 10/30

Bring No. 2 Pencils.

Covers Chap 19-21

Impedances:

$$Z_{\text{net}} = \sqrt{R^2 + X^2} \left\{ \begin{array}{l} Z_R = R \\ Z_C = \frac{1}{2\pi f C} \\ Z_L = 2\pi f L \end{array} \right\} \quad X = Z_L - Z_C$$



$$V_{\text{rms}} = I_{\text{rms}} Z$$

②

In a series AC circuit, at what frequency is Z the lowest?
 $f_R = \text{resonant } f$

Given the same voltage, at what freq will the current be the greatest?

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

RLC series: resonant f

RL series: Low f

$Z_L = 2\pi fL$ is small

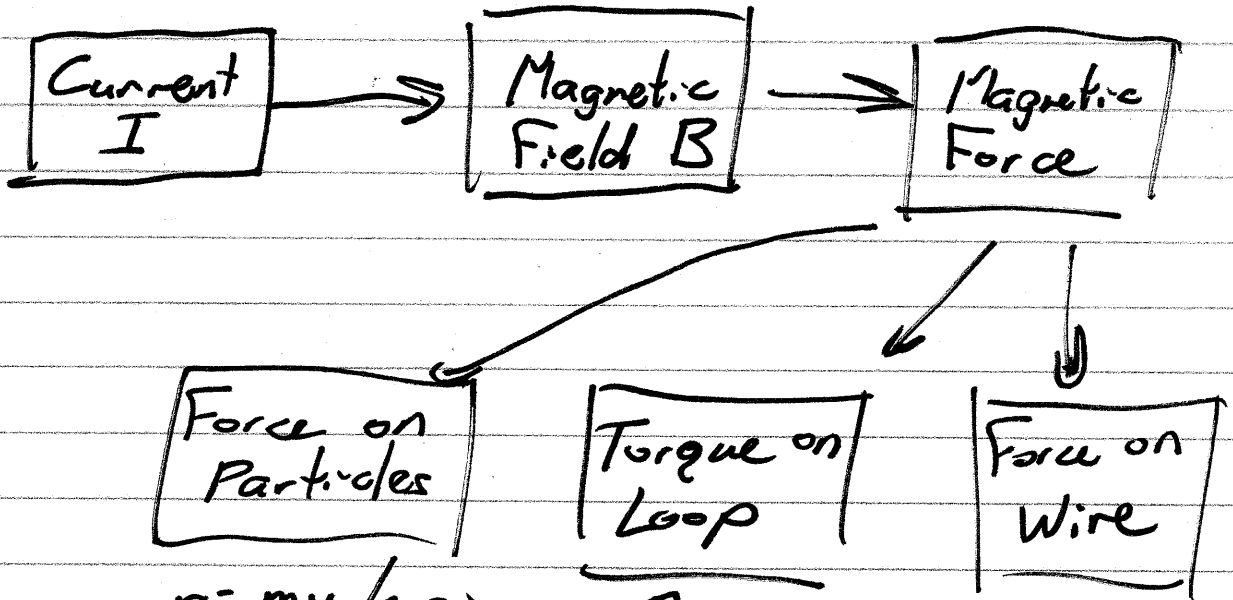
$I = V/Z$ is largest

RC series: High f

$Z_C = \frac{1}{2\pi fC}$ is small

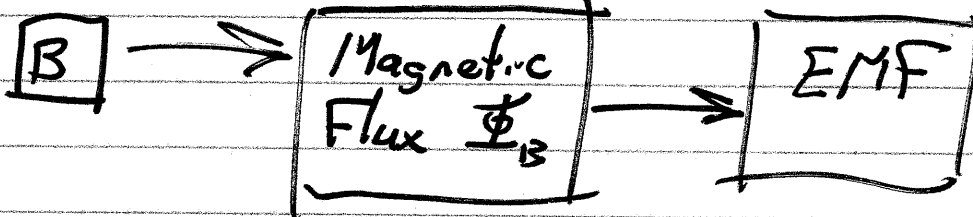
(3)

- Magnetism
- Induced Voltages (EMF)
- AC Circuits



$$r = mv_{\perp} / (qB)$$

$$\tau = NBAI$$



$$\max \Phi_B = NBA$$

$$\mathcal{E} = vBl$$

↑ speed
↑ voltage

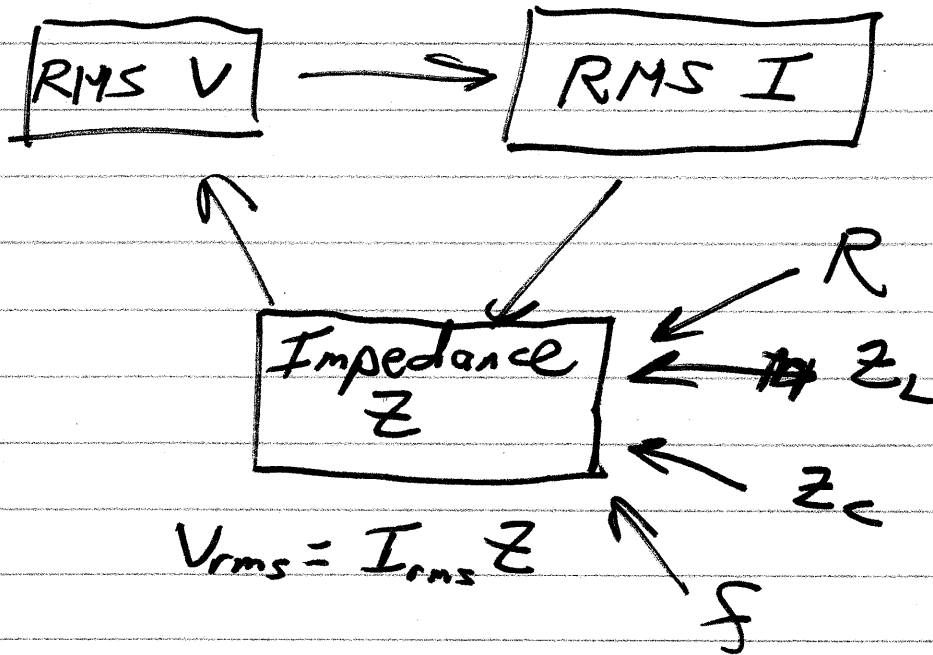
$$\mathcal{E} = NBA\omega$$

↑ angular speed

$$N\Phi = LI$$

$$\Phi = LI$$

④



"Capture Problems"

• Mass Spectrometer

$$r = \frac{mv_{\perp}}{qB}$$

— given velocity

— velocity selector

$$F_E = F_B$$

$$qE = qv_{\perp} B$$

Accelerator

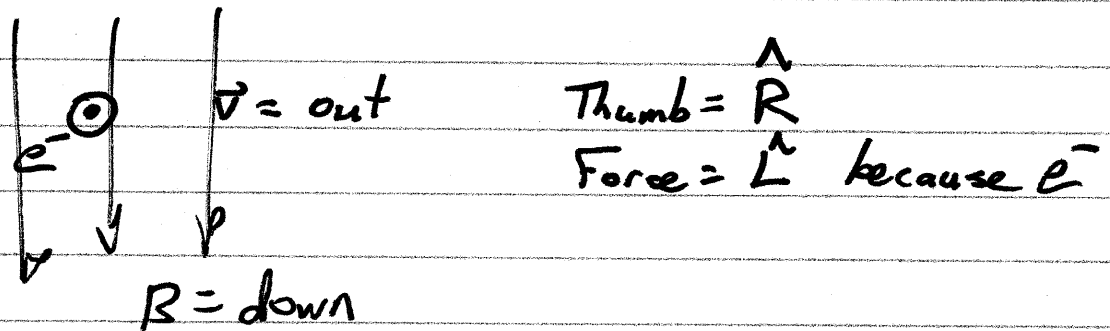
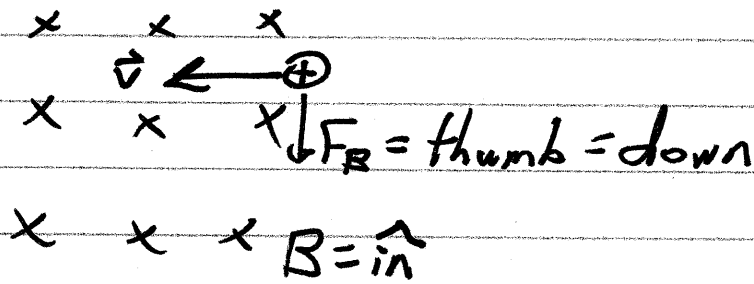
$$q \Delta V = \frac{1}{2} m v^2$$

voltage ↗

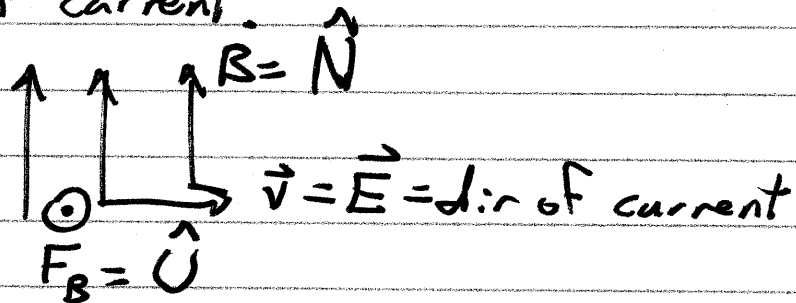
↑ velocity

• Series RLC, AC

⑤



\vec{B} is north
Want to "levitate" a current.
Dir of current?



Coordinate Systems

- $x y z$ = "model space"
- $LR UD$ in out = "paper space"
- $NSEW UD$ = geographic