Magnetism 4

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p 659 – Problems

49) Boeing 747

$V = 240\ m/s\ N$
$\Delta V = ?$
$l = 60m$
$B = 5 \times 10^{-5} T$
$\theta = 60°$ below horizontal

$F_e = F_B$
$qE = qvB\sin\theta$
$q\frac{\Delta V}{d} = qvB\sin\theta$
$\Delta V = VdB\sin\theta$
$(240\ m/s)(60m)(5\times10^{-5}T)\sin60°$

$\Delta V = .624V$

p 688 – Multiple Choice

3) mag flux is 10 Tm^2 meaning?

- no current induced (takes changing flux)

- Problems

10) How position bicycle tire so Φ_B through it due to Earth's mag field is as large as possible

a) orient wheel $\perp$ to Earth's surface

b) $B = 5\times10^{-5}T$
$r = .26m$

$\Phi = BA\cos\theta$
$= B\pi r^2$
$= (5\times10^{-5}T)\pi\,(.26m)^2$

$= 1.06\times10^{-5}\,Tm^2$

20) transcranial magnetic simulation

$B_0 = .8T$
$B_f = 0T$
$t = .080s$
$\mathcal{E} = ?$
$r = 1.2\times10^{-3}m$
circle brain tissue

$\mathcal{E} = -\frac{\Delta\Phi}{t} = -\frac{\Delta BA}{t} = -\frac{\Delta B\pi r^2}{t}$

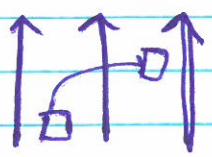
$= -\frac{(0T - .8T)(\pi)(1.2\times10^{-3}m)^2}{.080s}$

$= 4.52\times10^{-5}V$

63) rod L
moves speed v
$\perp$ B
$\Delta V = ?$

$F_e = F_B$
$qE = qvB$
$\Delta V = EL = vBL$
$(\mathcal{E} = Blv)$

– Reading



insect in strong B coils on insect

70) what changes as insect turns?

θ

71) flux through one coil?

$\Phi = BA = B\pi r^2 = (4\times10^{-3}T)(\pi)(2\times10^{-3}m)^2$
$= 5\times10^{-8}Tm^2$

72) Induced $\mathcal{E}$ during 90° turn

$$\mathcal{E} = -\frac{N\Delta\Phi}{t} = -\frac{(50)(-5\times10^{-8}Tm^2)}{.020s}$$

$$= +1.25\times10^{-4}V$$

73) What could double $\mathcal{E}$?

• double # coils • double coils area • double external B