

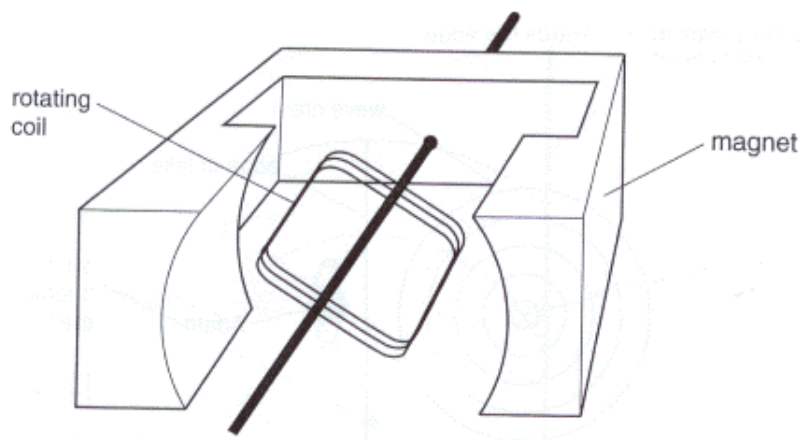
PHY 272: FIELDS
PROBLEM SET 9
due April 8th, before class

I. HOGWARTS HAS NOTHING ON PHY272

Explain how the “world’s simplest motor ” works: click [here](#) or [here](#). *Hint: a picture is worth a thousand words.*

II. GENERATOR

A square wire coil with N turns and sides equal to 10 cm is mounted inside a permanent magnet that produces a horizontal magnetic field $B = 100\text{ G}$ pointing to the right (which we will assume is constant in space, for simplicity). The coil rotates around its axis 10 times a second counter-clockwise as seen from outside the page (I mean, its angular velocity points outside the page). What is the electromotive force generated?



III. ADDING INDUCTORS

- Two inductors L_1 and L_2 are connected in series. Show that the effective inductance is $L_1 + L_2$.
 - Two inductors L_1 and L_2 are connected in parallel. Show that the effective inductance is $(1/L_1 + 1/L_2)^{-1}$.
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