ELEC 435
Problem Set 4
Due: September 26, 2014

Homework Problems.

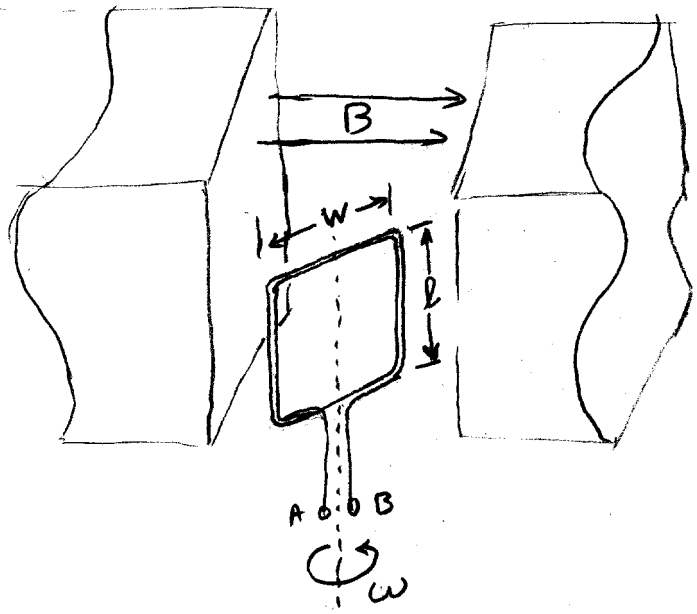
H4.1 A proton at rest is accelerated for 1 μs by an electric field of 2 kV/m and then enters a magnetic field of 200 μT which is perpendicular to its direction of motion. Find

(a) the proton's velocity

(b) its path in the magnetic field

H4.2 Two long, straight, parallel wires are separated by 20cm. Each is carrying a current of 10A in the same direction. Find the force per unit length acting on the wires.

H4.3 The loop below has 10 turns. Its dimensions are l = 3 cm and w = 2 cm. It is rotating at 1000 rpm in a uniform, parallel field of 1 T. What is the induced voltage between terminals A and B?



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Quiz Problems.

Q4.1 Below is a sketch of a capacitive fuel gage. It consists of two parallel metal plates, each 5 cm wide (w), and 40 cm long (l), separated by 1 mm (d). The fuel (gasoline) has a dielectric constant of 1.95.

(a) Write an expression for the capacitance as a function of fuel level.

(b) The fuel gage circuit is designed to turn on a warning light when the tank is less than 1/4 full. At what value of capacitance should the light come on?