Assignment 2

You may use any resources for help (e.g. textbooks, notes, etc.) as possible. 30 points are available.

Assignment overview:

The two questions below are mandatory. The next question (Problem 5) is also mandatory. Students are encouraged to solve other problems as well. Students are also encouraged to write their own problems and submit them. They will be assessed as part of their homeworks.

Common Rules for Questions 1-3

1. The length of the conductor (L = 10.0 cm, width (W = 1.0 cm) and thickness (t = 1.0 cm), the number of turns N = 1, the current I = 1.0 A, the magnetic field B = 0.1 T and the velocity v = 0.1 m/s.

2. When the conductor is in rest, evaluate the magnitude of the magnetic field inside the conductor. (Please enter your answer in units of T.)

3. When the conductor is in motion, calculate the force per unit length exerted on the conductor.

Common Rules for Question 4

4. The magnetic field inside the conductor is calculated using the formula:

   \[ B = \frac{\mu_0 I}{2\pi r} \]

   where \( r \) is the distance from the center of the conductor to the point of interest. \( \mu_0 \) is the permeability of free space.

5. Calculate the force on the conductor if the magnetic field is B = 0.1 T and the current is I = 1.0 A. The conductor is 10 cm long and 1 cm wide. The force is calculated using the formula:

   \[ F = BIL \]

   where \( L \) is the length of the conductor.