ELEC 435
Problem Set 9
Due: November 7, 2014

Homework Problems.

H9.1 The figure below is a magnetic device having a steel movable wedge located between two poles. The cross-sectional area of the left pole is twice that of the right pole. Fringing of the flux around the pole edges may be ignored.

   (a) What is the direction of the force on the wedge?

   (b) Is the force dependent on the position of the wedge if the flux is kept constant?

   (c) Is the force dependent on position if the current is kept constant?

   (d) If the area of the right pole is 100 mm^2 and both are gaps are 1 mm in length, and the coil has 200 turns, find the force for a current of 10A.
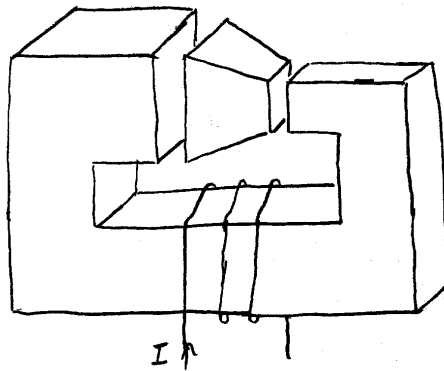
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Quiz Problems.

Q9.1 The system below is intended to provide a source of electric light during power outages: when the power fails, the weight is released, rotating the shaft of the motor, which acts as a generator. The motor is a permanent magnet DC motor with an armature resistance of 2 Ω and a no-load speed of 1200 rpm when connected to a 12 V battery. The light bulb has a resistance of 8 Ω. The moment of inertia of the rotating components, as well as the friction in the bearings, is negligible.

   (a) Sketch the voltage $v(t)$ following the release of the weight.

   (b) What fraction of the potential energy of the weight is delivered to the light bulb?