Monday Reading Assessment: Unit 4, Sources of Magnetic Fields

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1 Memory Bank

- $d\vec{B} = \frac{\mu_0 I}{4\pi} \frac{d\vec{l} \times \hat{r}}{r^2}$ ... Biot-Savart Law
- $\vec{B} = (\mu_0 I)/(2\pi r)\hat{z}$ ... B-field of a current I a distance r away from the conductor carrying the current. The direction $\hat{z}$ is given by the right-hand rule #2 (RHR-2).

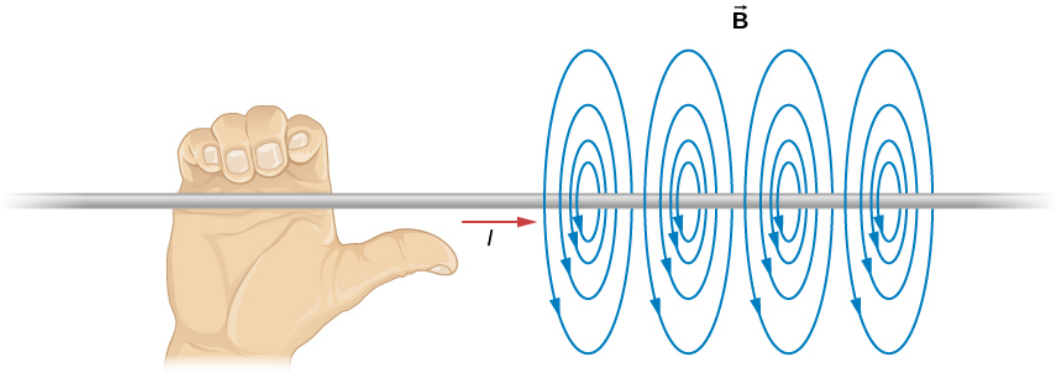

Figure 1: The B-field of a wire surrounding a current-carrying wire.

2 Magnetic Forces on a Wire

1. Consider Fig. 1. (a) Define a coordinate system that describes the three directions in the problem: the vector pointing some distance away from the wire, the direction of the current, and the direction of the B-field some distance away from the wire. All three directions should be mutually perpendicular. (b) What is the B-field vector 1 cm below the wire, if the current is 10 A?

2. Suppose a row of charges was motionless a distance y *above* the wire. What would happen to the charges if the wire moved *towards* them?