Advanced Electromagnetic Theory

PHYS 5333, Fall 2009

Due Date: Noon Feb. 23

Problem Set # 2
Submit only <u>Bold and underlined</u> problems.

<u>Problem 1</u>: **Magnetic damping of a conducting ring**
A thin copper ring is free to rotate about a diameter, which is perpendicular to a uniform magnetic field $\boldsymbol{B}$. If the ring is given an initial angular velocity ω_0, calculate the time taken by the angular velocity to decrease to 1/3 of its initial value. Assume that the energy goes into Joule heating. [Moment of Inertia of a ring about its diameter is $Mr^2/2$, where M is the mass and r is the radius of the ring. The resistivity of copper is 1.8×10^{-8} Ω-m, the density of copper is 8.9×10^3 kg/m^3. Take $\boldsymbol{B}$=0.02 T. [Hint. Assume that change in energy during one rotation is very small.]

Jackson: **<u>5.25[a, b, and d for square loop only, 5.26]</u>**, 6.2, **<u>6.4, 6.8</u>**

Griffiths: 7.2, 7.8, 7.10, 7.12, 7.15, 7.17, 7.18, 7.19, 7.20, 7.21,7.22, 7.25, 7.27, 7.30, **<u>7.32</u>**, 7.54, 7.58