

Assignment 12
PHGN361

Homework due April 20

1. Read section 7.2.1 and 7.2.2, 7.2.3, 7.2.4.
2. Chapter 7 problems 17, 18, 20, 26, 29
3. Watch two videos on Youtube. To find these search youtube for "HAARP at work?" and then "HAARP Nature Modification Weapon! Project Blue Beam." List questions you have about the videos. Write a paragraph or two on what is convincing and what is not convincing about the argument in the second video.
4. A bar magnet with constant dipole moment $\vec{\mu} = \mu\hat{z}$ moves on the symmetry axis of a circular loop of radius a , resistance R , inductance L . It moves downward under the influence of gravity. Its motion is constrained to be along the z -axis, and the magnetic dipole moment to be parallel to that axis.
(a) Derive an expression for the equation of motion for the dipole using equation 6.3. Note that $B_z = \mu_0 I a^2 / (2(a^2 + z^2))$ is the z component of the magnetic field from the circular loop where I is the current in that loop. (b) Apply Faraday's law by inserting Ohm's law and the inductance of the wire loop into Faraday's law to obtain an ordinary differential equation in the loop current I . This is the mathematical manifestation of the "feedback" effect of the current in the loop on itself.