

Physics 200

Chapter 32 Inductance (Homework)

1. Calculate the inductance per unit length of a coaxial cable. The inner conductor has a radius, a , and the outer conductor has radius, b .
2. A solenoid has " N " turns, has length, D , and radius, a . At what rate is the current through the solenoid changing if the inductor voltage is " V_1 "?
3. A toroid consists of " N " turns and has a rectangular cross section. The inner radius is " a ", the outer radius is " b " and the height is " h ". Calculate the inductance of the toroid.
4. A resistor, R , and an inductor, L , have been connected to a battery, V , for a very long time. What is the power at the resistor as a function of time after the battery has been removed?
5. A resistor, R , and an inductor, L , are connected to a battery, V . What is the power at the resistor as a function of time after the battery has been connected?
6. A resistor, R , and an inductor, L , are connected to a battery, V . After they are connected together, what is the voltage across the resistor as a function of time?
7. An LC circuit consists of an inductor, L , and a capacitor, C . If the maximum current is " I_{\max} ", what is the maximum voltage across the capacitor?
8. A long thin solenoid has length, D , " N " turns per meter and carries a current, I . Determine the energy density of the solenoid's magnetic field.
9. Calculate the energy stored in the inductor of a charging RL circuit as a function of time after the battery, \mathcal{E} , has been connected.
10. Determine the energy stored in an infinitely long solenoid's magnetic field. The solenoid has length, D , current, I , radius, a , and " n " turns per unit length.