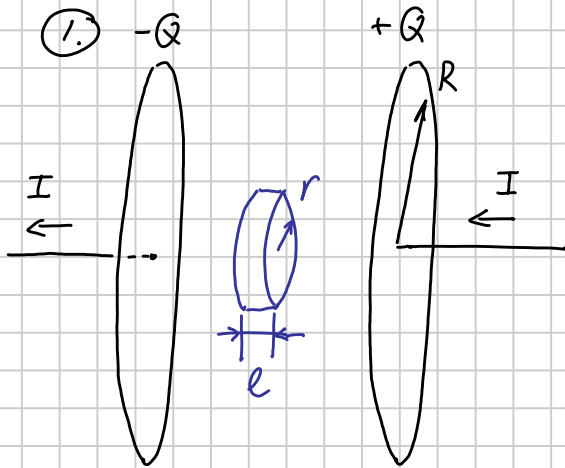


# Homework 10

Note Title

3/26/2008



Consider a capacitor consisting of two metal disks of radius  $R$ .

The capacitor is being charged by current  $I$ .

At a moment of time when charges on the disks

are  $+Q$  and  $-Q$  find

a) energy of electromagnetic field (Eq. (8.5), p. 346) inside a cylinder of radius ' $r$ ' and length ' $l$ ' near the axis of a capacitor. (Neglect fringe effects)

b) rate of change of the energy found in part a)

c) Flux of energy through the surface of this cylinder, given by the last term in Eq. (8.11). Compare c) to b) [5 points]

② a) Show that the standing wave

$$\vec{E} = (E_0 \sin kz \cos kv t, 0, 0)$$

is the solution of Maxwell's equation.

b) Find magnetic field  $\vec{B}$ .

↓ see next page

c) Find electromagnetic energy density (energy per unit of volume) and energy flux for this wave. [5 points]