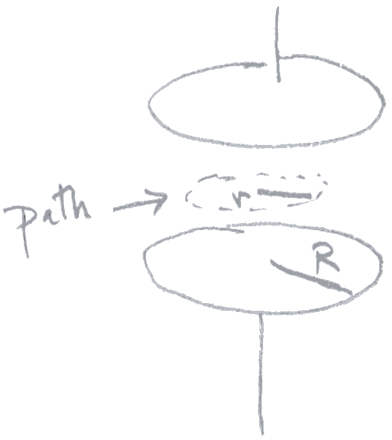
4. An oscillating current $I(t)$ is applied to a circular capacitor. First draw a path over which to apply Ampere's law inside the capacitor and apply it in a side view of the capacitor. Assume $\vec{B} = \mu_0 I(t) s/(2A)\hat{\phi}$ where $A$ is the area of the capacitor and $s$ is the radial distance from the symmetry axis.




$E = \frac{\sigma}{\epsilon_0} = \frac{Q}{\epsilon_0 A}$

AMPS

$$\oint \vec{B}\cdot d\vec{l} = \mu_0 I_{encl} = \mu_0 \epsilon_0 \frac{\partial}{\partial t}\int \vec{E}\cdot d\vec{a}$$

$$B\, 2\pi r = \mu_0 \epsilon_0 \frac{1}{\epsilon_0 \pi R^2}\left(\frac{\partial}{\partial t} Q\right)\pi r^2 = \mu_0 I(t)\frac{r^2}{R^2}$$

OR FARADAY'S

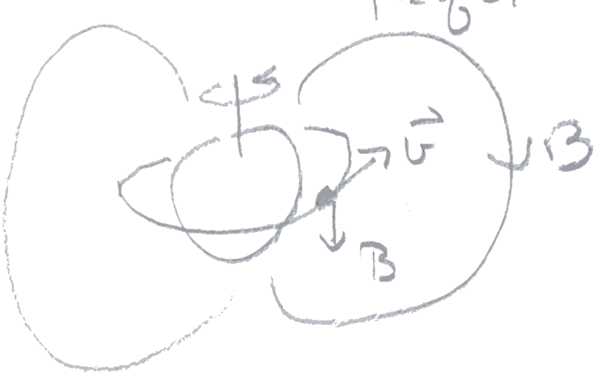
$$\oint \vec{E}\cdot d\vec{l} = -\frac{\partial \Phi_B}{\partial t} = -\frac{\partial}{\partial t}\int \vec{B}\cdot d\vec{a}$$


5. Assume that the theory of gravity is analogous to that of electricity and magnetism. For the analogous magnetic forces what do you expect to happen to a satellite orbiting a rotating planet with the axis of rotation of both along the same direction and explain the analogy.

$m \leftrightarrow q$ rotating mass $\longleftrightarrow$ rotating spherical charge dist.

$\Rightarrow$ $\vec{B}$ due to $\vec{J}$ which is a magnetic dipole

$\vec{F} = q\vec{v}\times\vec{B}$




Force toward planet.

It was recently measured