

The new model for a charged capacitor

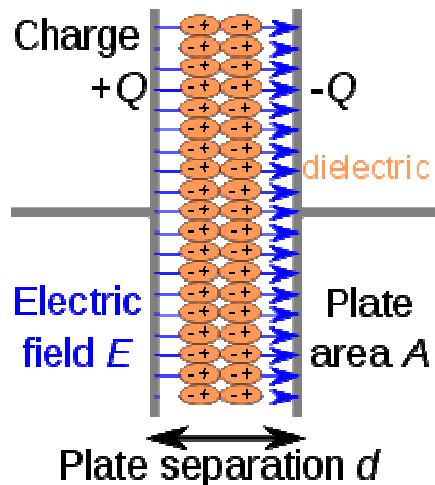
First, the old model in Wikipedia.

Capacitor

From Wikipedia, the free encyclopedia

<http://en.wikipedia.org/wiki/Capacitor>

When there is a [potential difference](#) (voltage) across the conductors, a static [electric field](#) develops across the dielectric, causing positive charge to collect on one plate and negative charge on the other plate. [Energy](#) is stored in the electrostatic field.

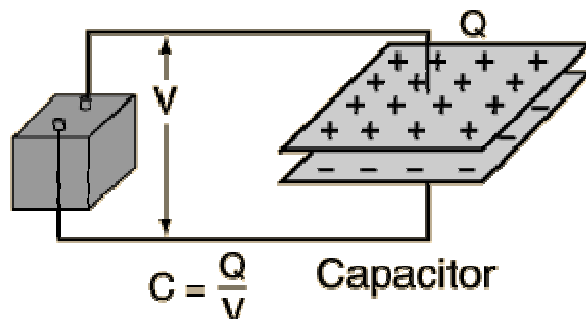


End of Wikipedia.

Here is the standard model for the energy stored in a capacitor.

<http://hyperphysics.phy-astr.gsu.edu/hbase/electric/capeng.html>

Energy Stored on a Capacitor

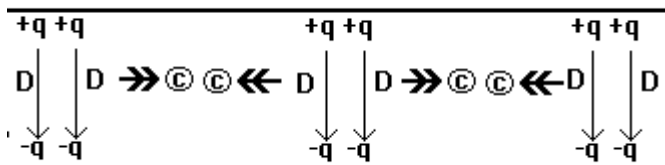
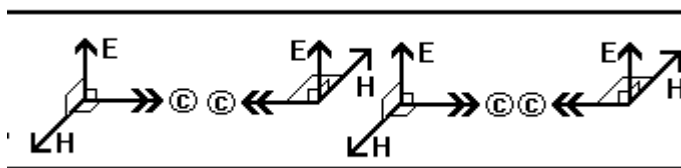


The energy stored on a [capacitor](#) can be calculated from the equivalent expressions:

$$U = \frac{1}{2} \frac{Q^2}{C} = \frac{1}{2} QV = \frac{1}{2} CV^2$$

This energy is stored in the [electric field](#).

However, the results of the Wakefield experiment <http://www.ivorcatt.co.uk/965.htm> mean that the conventional model for a charged capacitor, above, has to be replaced by;



The energy stored in a capacitor is not contained in a static electric field. It is contained in electromagnetic fields.

Energy stored in the capacitor.

There follows from http://www.ivorcatt.co.uk/1_2.htm a discussion of the total energy travelling to the right. Since this is only half the energy, the voltages and currents are halved. We find that half the energy is stored in electric field and half in magnetic field. This contradicts what went before in Wikipedia, where all the energy is in an electrostatic field (of twice the voltage). Because of the square term (squaring half the voltage or half the current), each energy is one quarter of that in Wikipedia, which was

$$U = \frac{1}{2} \frac{Q^2}{C} = \frac{1}{2} QV = \frac{1}{2} CV^2$$

, but there are four of them – electric energy travelling to the right, magnetic energy travelling to the right, electric energy travelling to the left, magnetic energy travelling to the left.

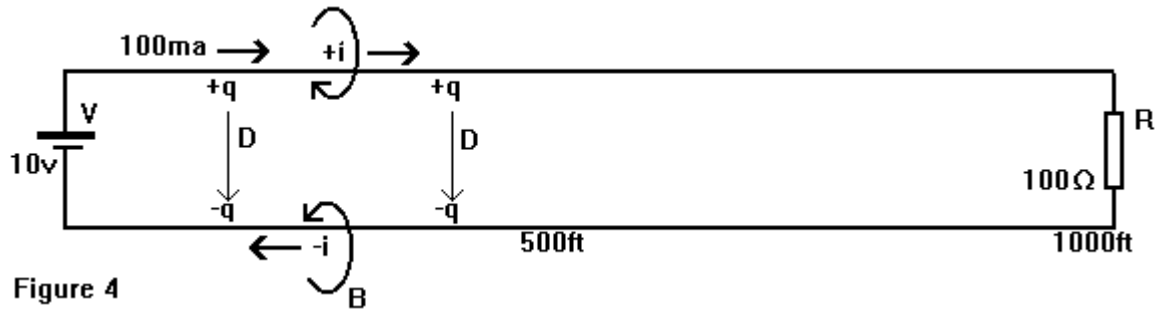


Figure 4

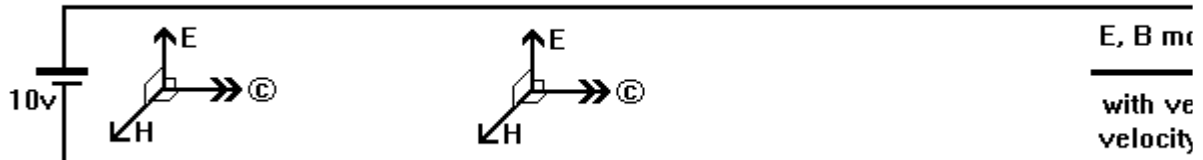


Figure 5

The space between the two conductors, shown in cross section (Fig.2), is filled by tubes of electric displacement D . Each tube of electric displacement terminates on unit positive charge on the upper conductor and unit negative charge on the lower conductor ^u. If the capacitance between the two conductors is C , then the total charge on each conductor is given by $Q = CV$. If the capacitance per foot is c , then the charge per foot is $q = cV$.

The energy stored in the electric field between the conductors is

$$\frac{1}{2} CV^2 \text{ (Ref. 1), or } \frac{1}{2} cV^2 \text{ per unit length.}$$

The space between the two conductors is filled by tubes of magnetic flux which encircle the current in the conductor.

If the self inductance of the pair of conductors is L , then the total magnetic flux passing between the conductors is $\Phi = L I$. If the inductance per unit length is l , then the magnetic flux per unit length is $\phi = l I$.

The energy stored in the magnetic field created by the current in the two conductors is

$$\frac{1}{2} L I^2 \text{ (Ref. 2), or } \frac{1}{2} l I^2 \text{ per unit length.}$$

Power is delivered by the battery into the circuit at the rate of watts which is the product of voltage and current. This equals $10v \times 100ma = 1 \text{ watt}$. The resistor absorbs energy at the same rate, and turns 1 watt of electric power into heat, which then radiates from it.

The energy trapped in the fields between the conductors totals

$$\frac{1}{2} CV^2 + \frac{1}{2} LI^2 \quad (1)$$

The energy stored in each unit length is

$$\frac{1}{2} cV^2 + \frac{1}{2} lI^2 \quad (2)$$

All of the above is nonsense.

There is no such thing as an electric field or a magnetic field. That illusion is what is the cause of all the $\frac{1}{2}$ s above. As shown above in the last diagram, the energy is two dimensional $E \times H$. This gives us Watts, something like $A \times V$.

Ivor Catt. 2 October 2012