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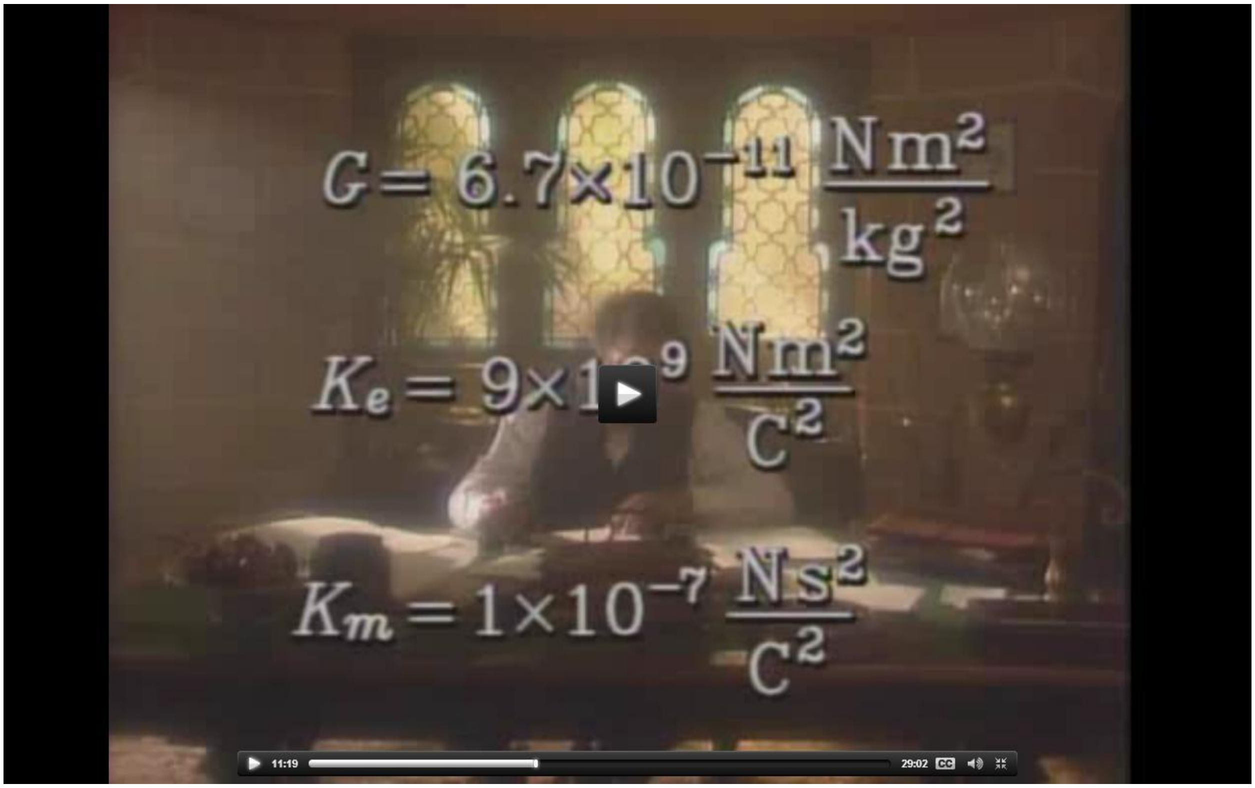
ON DERIVING THE INVERESE SQUARE LAWS OF NEWTON, COULOMB, AND LORENTZ



http://www.learner.org/vod/vod_window.html?pid=604

I ran across this video at http://www.learner.org/vod/vod_window.html?pid=604 . It did a derivation of the speed of light in a way I'd never seen before using a constant K_m that I'd never seen before. (see above screen shot). The derivation simply took the ratio of K_e to K_m and this yielded the speed of light, c. Very elegant and succinct derivation. However I was struck by the fact the units were all wrong , so the derivation is technically all wrong. Having said that it still gives the correct results so we have to first correct the equations and then justify the results.

The video lists the force of the magnetostatic field as being

$$F_m = \frac{\rho_1 \rho_2}{r^2} K_m$$

Note however the units of K_m

$$K_m = \frac{Ns^2}{C^2}$$

The units of the equation and the constant are not homogenous. The original deriver has replaced the squared distance with squared time. In order to stay true to the constant we must change the equation from one of squared distance to square time. Note this still preserves the inverse square characteristic of the equation however we must now regard the charge as being a function of squared time as opposed to being a function of squared distance.

Therefore

$$F_m = \frac{\rho_1 \rho_2}{s^2} K_m$$

Note that both equations of the constant list a coulomb squared term in the denominator thus both rho and q are the same or equivalent quantities. But we know that the q and B fields operate orthogonally. However the rho equation doesn't ostensibly display any units or characteristics of magnetism. Note however that if rho and q are equivalent then the rho equation is a function of the square of charge per time or the square of the current. A current will induce a magnetic field. This induction of such a field has no velocity however. The above equations seem to imply magnetism without velocity but it also implies an induced magnetic field due to change. Is this Maxwell's displacement current or a function of the Poynting vector? Whatever its exact physical interpretation is we will leave for now. What we can definitely say is that it acts at a right angle to the Coulomb's law force. And from the Lorentz law we know its orthogonal interacting partner is the Lorentz force where E=F/q= qv x B. This Lorentz force must be equivalent somehow to the rho equation.

Therefore F=qqvxB.

Since via Crews law

$$F_e = \frac{q_1 q_2}{r^2} Rc$$

Where R= 30 ohms and c is the speed of light.

Since the Crews law and the Lorentz force are equivalent we can equate the two. Using Norma's law where

$$B = \frac{R}{r^2}$$

We get

$$F_m = \rho_1 \rho_2 \frac{R}{r^2} c = \frac{R}{r^2} K$$

R is in units of ohms. Ohms are defined by V/i=R. Therefore the units of R are

$$\frac{Nms}{\rho^2} = \frac{h}{C^2}$$

Thus

$$F_m = \rho_1 \rho_2 \frac{R}{r^2} c = \frac{R}{r^2} K_{m2} = \rho_1 \rho_2 \left(\frac{h}{C^2}\right) \frac{1}{r^2} c = \rho_1 \rho_2 \left(\frac{h}{C^2 r^2}\right) c = \frac{h}{r^2} c$$

The upshot is that with the above equation we may apply the inverse square law to several different parameters:

Square of the charge to square distance where we now have

$$K_{m1} = Rc \equiv K_e$$

R to the square of the distance where we now have

$$K_{m2} = \rho_1 \rho_2 c$$

Quantum of action per pair of magnetic particles per the distance squared where we have once again

$$K_{m2} = \rho_1 \rho_2 c$$

Planck's constant or quantum of action to the square of the dipole moment, where we have again

$$K_{m2} = \rho_1 \rho_2 c$$

Planck's constant or quantum action to the square of the distance. where

$$K_{m3} = c$$

The speed of light to the square of the distance where

$$K_{m4} = h$$

Lastly and rather strangely we have a pure scalar effect. Where

$$F_m = \frac{N}{r^2} hc \; and \; K_{m5} hc$$

Also note that if we divide R by Maxwell's K_m this yields the speed of light. Therefore

$$\frac{R}{K_m} = c$$

$$cK_m = R$$

$$c^2 K_m = Rc = K_e$$

and

$$K_m = \frac{K_e}{c^2} = \frac{R}{c} = \frac{h}{c\rho^2}$$

I suspect since I've never seen the Maxwell version of K sub m that the original deriver by happenstance noticed the order of magnitude similarities of the square of c and Coulomb's constant. I suspect it was a fortuitous use of the law of dimensions without the deriver being aware of the universality of the technique.

The bottom line is it has been demonstrated that the Lorentz force is not only equivalent to Coulombs law but that it may also be expressed in terms of an inverse square law where the constant h effectively replaces the 2 interacting acting charges.

This satisfies the condition of no magnetic monopoles, however the equations make clear that there are indeed monopoles of a type yet they are always required to act as a pair. Even h, which ostensibly could be considered as a monopole always acts, begins and ends along a dipole moment. The dualism of interaction is ineluctable. Spinors dictate it as does the above algebra. To round off the discussion we can express the Newton's universal constant of gravity as k gamma sigma. Now all entities can be expressed in terms of the inverse square law in terms of charge.

As an added note from the GFT we have:

I played around with the tExB=qr induction equation dimensionally some more. Note:

tE=tF/q=F/i or force per current.

However the more exciting expression is tE=tF/q which is equivalent to tFr/qr=tU/qr=h/qr=S/qr where U is energy and h and S are action. This ties us right in with the least action principle. I will be exploring this aspect more in the future.

Therefore

$$\frac{h}{qr}\, x\, B = qr$$

Therefore

$$h\, x\, B = (qr)^2$$

Therefore

$$B = \frac{(qr)^2}{h} = \frac{(\rho r)^2}{h}$$

These equations tell us that there is a type of magnetic monopole and that magnetic monopole is actually h. But that h is a consolidation of 2 dipole moments. Thus in effect no single magnetic monopole.

$$F_m = \rho_1\rho_2 \frac{R}{r^2} c = \frac{R}{r^2} K_{m2} = \rho_1\rho_2 \left(\frac{h}{C^2}\right) \frac{1}{r^2} c = \rho_1\rho_2 \left(\frac{h}{C^2 r^2}\right) c = \frac{h}{r^2} c$$

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