Re: 1 FERTZ

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From: Bjoern Feuerbacher (*feuerbac_at_thphys.uni−heidelberg.de*)
Date: 06/02/04

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Date: Wed, 02 Jun 2004 18:40:59 +0200
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Y.Porat wrote:
> Bjoern Feuerbacher <feuerbac@thphys.uni−heidelberg.de> wrote in message news:<c9k5ivhn1@news.urz.uni−heidelberg.de>...
>
>>Y.Porat wrote:
>>
>>>Bjoern Feuerbacher <feuerbac@thphys.uni−heidelberg.de> wrote in message news:<c9hgus$pr5$1@news.urz.uni−heidelberg.de>...
>>>
>>>
>>>>Y.Porat wrote:
>>>>
>>>>
>>>>>Bjoern Feuerbacher <feuerbac@thphys.uni−heidelberg.de> wrote in message ne
>>>>>
>>>>>
>>>>>>
>>>>>>>−−−−−−−−−−−−−−−−−−
>>>>>>>because *you are unable to do it crook!!!
>>>>>>
>>>>>>For the 30th time: according to Maxwell's equations, a multipole moment
>>>>>>which is changing periodicaly with a frequency f will produce an em wave
>>>>>>with that same frequency f. That was proved more than 100 years ago.
>>>>>
>>>>>−−−−−−−−−−−−−−−−−−
>>>
>>>we are not interested in your 'explanations'
>>>we are interested in your *calculations*− crook
>>
>>The calculation I referred to above can be found in any textbook. But
>>since you *insist*, I will reproduce it here (and you won't understand
>>anything about it and will call it "obfuscation"...).
>>
>>This will get a bit long, but you insisted... I won't give all of the
>>tiny steps in between − if you want to see those, too, you can look them
>>up in any book on electrodynamics. Most of them even can be found in
>>books on vector calculus.
>>

>>
>>Start with Maxwell's third equation:
>> div B = 0 (1)
>>Keep in mind that B and E are vector fields, and please notice that I
>>am working in Gaussian units! Also, I only give the derivation for a
>>charge density and current density in a vacuum (after all, the earth
>>moves through a vacuum!); the derivation for other media would be similar.
>>
>>This implies that there exists a vector field A (called the "vector
>>potential") so that
>> B = rot A (2)
>>Now take the second equation:
>> rot E = − 1/c del B / del t (3)
>>(the "del's" imply here a partial derivative)
>>
>>Insert (2) into (3) and rearrange the formula:
>> rot(E + 1/c del A / del t) = 0
>>
>>This implies that there exists a scalar field Phi (called the "scalar
>>potential" or simply "potential") so that
>> E + 1/c del A / del t = − grad Phi (4)
>>
>>Now take the first equation:
>> div E = 4 pi rho
>>and the fourth:
>> rot B = 4 pi/c j + 1/c del E / del t
>>rho is here the charge density (a scalar field) and j is the current
>>density (a vector field)
>>
>>Insert (2) and (4) here and rearrange the equations a bit; the results are:
>>(1/c^2 del^2/del t^2 − Del) Phi − 1/c del/del t (div A + 1/c del Phi/del
>>t) = 4 pi rho (5)
>>and
>>(1/c^2 del^2/del t^2 − Del) A + grad (div A + 1/c del Phi/del t)
>>= 4 pi/c j. (6)
>>I use "Del" here to denote the Laplace operator.
>>
>>Phi and A are not uniquely defined; one can make a so−called "gauge
>>transformation" without changing E and B. I.e. one can use
>> Phi ' = Phi + 1/c del/del t Lambda
>>and
>> A' = A − grad Lambda
>>instead of Phi and A, with an arbitrary function Lambda. One can use
>>this gauge freedom to simplify the equations (5) and (6) above ("gauge
>>fixing"); one gauge condition which is commonly used is the "Lorentz gauge":
>> div A + 1/c del Phi/del t = 0
>>
>>So the equations (5) and (6) simplify to:
>> (1/c^2 del^2/del t^2 − Del) Phi = 4 pi rho
>>and
>> (1/c^2 del^2/del t^2 − Del) A = 4 pi/c j.

>>
>>Now these differential equations can be solved with the help of the
>>so−called "retarted Green's function" (one could also use the "advanced
>>Green's function" or linear combinations of the two, but for emission
>>of radiation, the retarted Green's function is the relevant one). One
>>then gets the "retarted potentials":
>> Phi(r,t) = int dV' rho(r, t − |r−r'|/c) / |r−r'| (7)
>>and
>> A(r,t) = 1/c int dV' j(r, t − |r−r'|/c) / |r−r'| (8)
>>The integral here runs over the whole volume, r and r' are vectors, and
>>the combination t − |r−r'|/c is called the "retarted time".
>>
>>So far, the derivation has been completely general. Now we come to
>>charge and current densities which change periodically:
>> rho(r,t) = rho_0(r) e^(−i omega t) (9)
>>and
>> j(r,t) = j_0(r) e^(−i omega t) (10)
>>(please notice that rho_0 and j_0 are not entirely arbitrary − they obey
>>the continuity equation). omega here is the "circular frequency"; it is
>>simply an abbreviation for 2 pi f, where f is the frequency.
>>
>>Insert (9) and (10) into (7) and (8) and rearrange the equations a
>>bit; then one gets:
>>Phi(r,t) = e^(−i omega t) int dV' rho_0(r) e^(i omega |r−r'|/c)/|r−r'|
>>and
>>A(r,t) = e^(−i omega t) 1/c int dV' j_0(r) e^(i omega |r−r'|/c)/|r−r'|.
>>
>>So we see that the potentials have the *same* time dependence as the
>>charge and current density, i.e. both are periodic functions of the time
>>with the *same* frequency as the densities. Since we are only interested
>>in the time dependence, I will now introduce abbreviations for the
>>integral and write simply
>> Phi(r,t) = e^(−i omega t) Phi_0(r)
>>and
>> A(r,t) = e^(−i omega t) A_0(r).
>>
>>Now insert this into the equations (2) and (4); this gives:
>> E = e^(−i omega t) (−grad Phi_0(r) + i omega/c A_0(r))
>>and
>> B = e^(−i omega t) rot A_0(r).
>>
>>So we see that the fields have the *same* *periodic* time dependence as
>>the densities. In other words: if one has a charge and/or current
>>density which changes periodically with a frequency f, there will be
>>electric and magnetic fields which *also* change periodically with the
>>*same* frequency f. This result is *completely* general, it does not
>>depend on the frequency f in any way.
>>
>>The motion of the earth around the sun produces a charge and current
>>density which changes periodically with a frequency of 1/1 year. Thus
>>there will be electric and magnetic fields with that same frequency. In

>>other words, there is an electromagnetic wave with a frequency of 1/1 year.
>>
>>If you want to know more details about that wave, you have to do
>>the integrals (i.e. calculate A_0 and Phi_0), and then do the
>>derivatives to get E and B. From that, you can get the Poynting vector
>> S = c/4 pi (E cross B),
>>which tells you how much energy is radiated in which directions.
>>
>>But all these details are rather irrelevant, since the basic thing was
>>already proven above...
>>
>>
>>
>>
>>>1 fertz is a very acurate number
>>
>>That's a rather meaningless statement. 1 Hz, for example, is *also* a very
>>accurate number.
>>
>>
>>
>>
>>>(a mistake of your calculation of the order of 20 timwes
>>>will be also accepted as a good result!!!....)
>>
>>Well, my proof shows that the motion of the earth around the sun
>>produces electric and magnetic fields which have the *same* periodicity
>>as the motion of the earth around the sun, i.e. a frequency of *exactly*
>>1/1 year. There is no error at all here − the frequency comes out *exactly*.
>>
>>−−−−−−−−−−−−−−−−−−−−−−−
>
> that was very impressive

Nice that you think so.

Hint: one learns this stuff in the second year of a physics study here
in Germany. Not really "rocket science" − in contrast, fairly basic
stuff. As I said: this has been known for over 100 years now.

> but still i didnt see the botom line in figures

As suspected: you fail to get the point.

I repeat the relevant equations here:
  rho(r,t) = rho_0(r) e^(−i omega t) (9)
and
  j(r,t) = j_0(r) e^(−i omega t) (10)
I.e. we start with a charge and current distribution which is periodic
with the frequency f = omega / 2 pi. For the example here, f = 1/1 year
(since the motion of the earth around the sun *obviously* represents a

charge and current distribution which is changing periodically with that frequency!).

And we arrive at:
  E = e^(−i omega t) (−grad Phi_0(r) + i omega/c A_0(r))
and
  B = e^(−i omega t) rot A_0(r).
So the fields are *also* periodic with the *same* frequency f as above. In other words: there are periodic fields with a frequency of f = omega/2 pi = 1/1 year. In other words: there is an electromagnetic wave with the frequency 1/1 year.

Do you understand now? The frequency of the wave is the same as the frequency of the densities!

> you know i think that is i will insert numbers and
> actual data i will get 1 Hertz not 1 fertz
> what do you think about it?

I think that you didn't understand anything about the calculation.

Prove me wrong. Insert some figures in *any* of the equations above and get 1 Hz. I'm waiting...

> am i wrong ???
> letas see your figures!!(numbers)

See above. If the charge and current density change periodically with a frequency f (in the example here: f = 1/1 year), then the fields will change periodically with the same frequency f = 1/1 year.

> btw dont you realise that you are making a bigger and bigger asshole of
> youself ??

By writing down a mathematical proof, I'm making an asshole of myself? Interesting. You have a strange notion of what "asshole" means...

> do you think that the wole world is stoopid?

No − but I think that you haven't understood a word of my proof.

> to fail to see that you are a crook? and a sore looser?

Hint: you are *still* the only one who claims that.

> −−−−−−−−−
> −−−−−−−−−−−−−−−−−−−−
>

This time, you not only forgot to point out that you are a crackpot − you also forgot to mention your own name! Does this imply that you are ashamed yourself of the nonsense you write?

Bye,
Bjoern