Re: Intensity and what else affects a single ligth beam's temperature?

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2007−08/msg00218.html

* *From*: bz <bz+spr@xxxxxxxxxxxxxxxxxxxx>
* *Date*: Fri, 3 Aug 2007 12:31:37 +0000 (UTC)

"Sue..." <suzysewnshow@xxxxxxxxxxxx> wrote in
news:1186078701.621826.282590@xxxxxxxxxxxxxxxxxxxxxxxxxxxx:

> On Aug 2, 9:46 am, bz <bz+...@xxxxxxxxxxxxxxxxxxxx> wrote:
>
>> "Sue..." <suzysewns...@xxxxxxxxxxxx> wrote
>> innews:1186048569.997989.74820@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx:
>>
>>> On Aug 2, 6:00 am, bz <bz+...@xxxxxxxxxxxxxxxxxxxx>
>>> wrote:
>>>
>>> {snip stuff I don't doubt you understand]

.....

>>> If the load is pure resistance, we measure the current
>>> now and the voltage now to compute the power now.
>>>
>>> If the load is reactive we measure the current now
>>> and the voltage *at some−other−time* (imaginary)
>>> to compute the power now.
>>
>> NO! you still measure or compute the current NOW and the voltage NOW.
>> That is exactly what I have been telling you.
>
> Then remove phi from the calculation and demonstate

demon state ?

that you can arrive at the correct result without it.

phi corrects the TIME for v in the following equations so that v and i are
at the same instant in time.
The busses run a bit slow on the 'v line' but that does not make the
passengers on those busses imaginary, nor the time imaginary.

i = Ip sin(wt)
v = Vp sin(wt + phi)
[here i is current, Ip is peak current w is omega, the frequency
factor, t is time
v is voltage, Vp is peak voltage, phi is the phase difference
between
i and v, if any]
....
The instantaneous power is then
p = vi = VpIp sin(wt) sin(wt+ phi)

The current NOW (at this instant of time) time the voltage NOW (at this
instant of time), multiplied together give you the power NOW.

You were going show we
don't need imaginary time.
But you used imaginary
time in the second equation.

Phi is no more imaginary time than omega
is. It just represent the
phase difference between the voltage and the
current.

Phi is not NOW so it is imaginary.

Phi is used to compute what the voltage NOW is, starting with the peak
voltage.

> We don;t need phi or a calculation to to know the voltage now, we can read it directly from a scope.

That is what I have been trying to tell you. The voltage and current are REAL and can be measured in real time. Nothing imaginary about them at all. If I want to compute the integral of the instant power over a full cycle, I need a formula to do it, or I need to capture the data and numerically integrate it. Either will work just fine.

> > v = Vp sin(wt + phi)
> >
> > v is the voltage NOW, not at some other time.
> > i is the current NOW, not at some other time.
> >
> > p = iv gives the power NOW, not at some other time.
>
> If there is a spark gap or zener it will not perform those calculations. If there is enough potential NOW.
> It will fire NOW... and your scope will show it is NOW.
> REAL−LY! :o)

Exactly. Real voltage. Real current. Real power. Instant by instant.

> [...]
>
> > > > Show me how Phi is imaginary.
> >
> > > <<...the capacitor's reactance is an imaginary number (26.5258 −90o, or 0 − j26.5258),
> > > the combined effect of the two components will be an opposition to current equal to the complex sum of the two numbers. The term for this complex opposition to current is impedance, its symbol is Z, and it is also expressed in the unit of ohms, just like resistance and reactance. In the above example,
> > > the total circuit impedance is:...>>
> > > http://www.allaboutcircuits.com/vol_2/chpt_4/3.html
> >
> > That does NOT prove that Phi is imaginary.

> Most mathematicians have thier hands full proving
> that something about their scribblings represents
> something real. You want proof that is isn't real?

You have been claiming that certain things are unreal, just because complex numbers have been used in calculating them.
I have been trying to tell you that they are real. The use of complex numbers to represent things does NOT make the things imaginary.

> [...]
>
> > Ok, try this one. The bus line that runs by my house runs a bus every
> > 10 minutes.
> > Sometimes the busses run late.
> > Sometimes the busses run early.
> >
> > I make a plot showing the phase shift of the actual arrival times vs
> > the scheduled arrival times.
> > I study the plot and find that the busses are 'capacitive' when traffic
> > is low and passenger load is low.
> > Busses are 'inductive' when traffic is high and passenger load is high.
> >
> > The fact that I use phase and complex numbers in my analysis does NOT
> > make those riding the bus any less real. It does not make their times
> > of departure or arrival any less real.
>
> That isn't helpful. AC theory was chosen to illustrate
> complex numbers for a good reason.

Yes, but the good reason is NOT that the current, voltage or power is unreal.
The good reason is that it is convenient for adding phasors to represent them as complex numbers. That is the ONLY 'good reason'.

> Simpler problems
> that illustrate it well, just don't seem to exist. Removing
> the rungs from a ladder does not make it simpler to climb.
> Forgive me if I don't care to board the bus but the problem
> is all about a capacitor and the power company playing
> ping−pong with some energy. The eyes and jays will
> fall into place just like they have for over a hundred years
> if we stay focused.

And the instantaneous power changes sign. Integrating over a complete cycle gives the SAME average power as you get with your formula (converting from RMS to average).

.....

If 1/60 second is 360 degrees how many seconds is 45 degrees?

1 cycle = 0.017 seconds, so 45 degrees is 2.083E−3 seconds

Sample the current and voltage 45 degrees after a zero crossing

Which zero crossing? Voltage or current? Not that it matters for my answer.

Lets use current because we have a picture of that.

Nice picture. It shows why the power waveform has a frequency of 2 times the voltage waveform. Cute.

It ALSO shows the waveform of the power at each instant, just as I have been trying to explain to you for quite some time now.

Multiply together. Do you get kilowatts?

That depends on the circuit. You DO get the power. The 'peak' of the instant power, in the problem you gave, is 15.971 W.

or perhaps 16 pp x 0.707 ~= 10 watts rms.

Close enough, IF we could convert from peak instantaneous power to RMS, but the peak to peak 200** watts of power averages out to [close to] zero [0.256 W**] rather than 10 watts RMS. Remember, we MUST integrate over a complete cycle to get the average power. The power at any instant is like that steam piston driving that flywheel that I mentioned some time back.

http://upload.wikimedia.org/wikipedia/en/thumb/1/17/ACPower03CJC.png/300p
x−ACPower03CJC.png from
http://en.wikipedia.org/wiki/Power_factor

Look at the first power peak just under the intersection
of a blue and red trace. 45 degrees on the x axis.

I believe that is the point we are discussing.

X_C = 120 ohms
V ~= 120 (the peak is 0.707 x 120 volts)

Wrong. PP = 120 (RMS)* sqrt(2) to get peak from RMS. 120 x 1.414 or
divide by 0.707.
p−p is larger then RMS, not smaller!

To go from p−p to RMS, you _multiply_ by 0.707 (or divide by sqrt(2)).

I ~= 1

Does 1 amp look right for the second graduation on the
y axis and for the current sample at 45 degress?

I get more like 100 watts if I multiply I x E at that point
per your proposal to multiply I x E then integrate.

it is NOT I (RMS current) and E(RMS voltage) that you must use, you must
use i and v (or e), the current and voltage at a particular instant.

Well! I got a tenth of kilowatt; that is almost kilowatts.

Look at the picture again. See the note 'average power zero'? That IS the
integral over a complete cycle.
If we pick the voltage and current at 0.1.97055E−3 seconds (an instant of
peak power), the current is 0.95 A, the voltage is 105.225 V at that
instant in time (Peak voltage is 155.56V, but does not occur at that
moment).
That is going to give 100 Watts at that instant in time. **

Whether it is 16 watts or 100 watts, it seems far from
anything we can call real. 16 watts will keep a cup of
tea warm all day and 100 watts will brew a cup in 1/2 hour.

90 degrees later, the power is minus 100 watts. They sum to zero. The only power dissipated is in the 0.01 ohm resistor.

> Sigh... I really was planning to visit the radio supply for a few 6SN7's for my calculator. Please excuse the arithmetic 'till while the filiments are warming. :o)

You want me to send you some 807's? I don't use them so I have some spares. 12AX7s are better for calculators. I built some RS flip flops using them, back in the early 60's, along with a Heathkit color TV and scope.

> > > > That's unreal! You KNOW it is milliwatts or microwatts. When you skewed the sample for the imaginary current by an imaginary time (phi) , you got the real answer.

> > I didn't 'skew' anything. I found the voltage and current at each instant in time and integrated over a complete cycle.

** I did 'skew up' in that I forgot the 2 pi in my omega, but that does not make anything unreal.

> phi gives you the value at another *time*
> That is skewing time.

No. Phi makes sure that we are looking at current and voltage at the same instant in time. We need it because of how we set up the original definitions, not because anything is imaginary or unreal.

> > You need to integrate over one cycle to get the average power.

> If you got 16 watts or 10 watts I don't think you got it. I am getting 100 watts if the current at 45 degress is about an ampere. That is really missing the mark.

100 watts peak power is correct. I made a mistake in mathcad and forgot to multiply by 2 pi when feeding in the frequency, w(omega).

Instantaneous power has a meaning but it is not what you pay for.

Semantics again?

No. The power company only charges for the power you KEEP. If you take 100 watts on one quarter cycle and give it back on the next quarter cycle, the net is zero.

If you don't believe me, still, perhaps you will take this quote from the book cited above: [quote from page 85, complex impedance] It is convenient to represent the two elements of reactance, the magnitude and phase angle, in such a way that the results of combining

There is no angle. It is a time.

You are arguing with the book's author now. It IS an angle in this case. Transforms. You do understand that there is a correspondence between voltage−time and voltage−frequency or voltage−phase, don't you? You understand that we can freely transform between representation systems without changing what actually happens in any way, don't you?

> You can use time whether it is periodic or not but the
> angular measure only applies for a periodic waveform.
> The tail is wagging your dog.

No. If I put any wave form through a reactive component, the product of the instantaneous voltage and current still gives the instantaneous power.

Transforming from one representation system to another has no effect on what happens in the real world.
The map is not the territory.
If you forget WHY the map was drawn the way it is, you get the mistaken idea that Greenland is much larger than it really is.
If you forget WHY the map was drawn the way it is, you get the mistaken idea that the use of imaginary numbers in calculating current through a reactive component indicates that the current is not real.
If you forget WHY the map was drawn the way it is, you get the mistaken idea that movement along the t axis in Minkowski space is not real.

> Remember... we WANT some proficiency working
> in units of time because Minkowski space won't give
> us angles for anything but monocrhomatic light and
> that with a bit of gymnastics.

YEP, but that doesn't make the time discrepancy for a moving clock[as seen from another frame] 'unreal'.

> [...]
>
> > The voltage will lag the current by 90 degrees (assuming no resistance
> > or other reactance) or 4.167E−3 s
>
> See! That didn't hurt a bit. Your angle was really a
> time wasn't it?

It can be looked at that way, but it is just a model for what happens when I measure the voltage and current at an instant in time.

> > > I'll take the latter problem. By rejecting a formalism
> > > that labels some things as imaginary, you have lost
> > > track of what is real.

> > That is totally unreal.
> >
> > The voltmeter I carry around in my pocket (RS 22−802) does NOT show instant voltage nor current at all. It does display VDC, VAC[RMS], and ohms.
> >
> > I have 2 scopes in my ham shack and a couple more in my storage room. They WILL show the instantaneous voltage and [with a small series resistance] the instantaneous current. The A to D input of my laptop (audio in) can be used to sample the voltage and current on a real time basis and by using LABVIEW 8.2 (a copy of which I have in front of me at this moment) I can capture those values and perform the math necessary to display both the instant power and the average power.

> I would suggest using a larger resistor if you are actually going to sample it. Maybe 20 times the value of the "small series resistance"
> you take the current sample across.

Depends on the sensitivity of the instruments available and the noise level, but I agree it is easier, in the case under study, across a .1 ohm resistor than a .01 ohm resistor

> If you have 5 ohms, 0.1 ohms and 100uf we can cheat on the maths.
>
> http://www.allaboutcircuits.com/vol_2/chpt_4/3.html

> > Nothing imaginary takes place in capturing this data. The data is not imaginary. The calculations, as I have showed, do not require the use of imaginary numbers at any point.

> Just so the current and voltage samples are simultaneous.

right

> (that is the technique you claim will measure real power)

I testify, as an expert witness, that it will allow us to measure real INSTANTANEOUS power. Which must be integrated over a cycle to obtain average power which is all we have to pay for.

> > Unless you can explain to me how my scope or A/D card can access imaginary things, our conversation is now at an end.

> Just so the current and voltage samples are simultaneous.

So, we are in agreement at last and 'even on the number of mistakes'
[You multiplied by 0.707 instead of dividing and I forgot to multiply by 2 pi]
Agreed?

−−
bz

please pardon my infinite ignorance, the set−of−things−I−do−not−know is an infinite set.

bz+nanae@xxxxxxxxxxxxxxxxxxxx

−−
bz

please pardon my infinite ignorance, the set−of−things−I−do−not−know is an infinite set.

bz+spr@xxxxxxxxxxxxxxxxxxxx remove ch100−5 to avoid spam trap
.