

August 2012
Volume 118
Issue 1916
£5.10

www.electronicsworld.co.uk

Electronics WORLD

THE ESSENTIAL ELECTRONICS ENGINEERING MAGAZINE

Access over
2,500 brands
available from
RS Components.



**FIND IT.
DESIGN. IT
BUY IT.**

rswww.com/linecard



WHAT THE READERS SAY

ANSWERING THE CATT QUESTION

On page 38 of the June issue Raymond Boute gives us "a snow job", defined as "Slang chiefly US and Canadian of overwhelming someone with elaborate talk".

Boute cannot resolve the problem that we see in the web page he cites (www.ivorcatt.co.uk/cattq.htm) that accredited experts totally contradict each other with their answers. Sir Michael Pepper, knighted for services to physics and now editing the top Royal Society journal, totally contradicts Boute, when he says "as the wave travels at light

velocity, then charge supplied from outside the system would have to travel at light velocity as well, which is clearly impossible".

The challenge posed by "The Catt Question" is not to "answer" it. This has already been done many times. It is to get professors and textbook writers to resolve their contradictory answers. Today, no one with accreditation in electromagnetic theory will make any written comment whatsoever on "The Catt Question".

Whereas in his letter of February 2012, Ian Darney writes: "Ivor has never mentioned the existence of photons...".

True. I worked within the framework of classical electromagnetism for decades and later found flaws in it, leading to my exclusion of electricity. When a battery is connected to a lamp, classical electromagnetic theory had electric current, later morphing into electrons, travelling in the connecting wires. This is taught in schools and colleges. There are no photons involved. The electric current creates a field between the wires. My letter referred to by Ian Darney discusses problems with the classical model. Photons arrived decades later, and still

today have never been involved in a battery lighting a lamp. If Ian Darney wants to resolve the flaws in classical theory by introducing photons, so be it. However, he needs to produce a properly structured theory involving photons helping a battery to light a lamp. His new theory will not have any bearing on my finding of flaws in classical theory.

Tony Callegari's letter [page 34, Letters, February issue] confuses my work with Liapunov, Korteweg and others who have nothing to do with electro-magnetism. The photographs in my articles do not exhibit soliton waves. "Solitons are caused by a cancellation of nonlinear and dispersive effects in the medium". (The term 'dispersive effects' refers to a property of certain systems, where the speed of the waves varies according to frequency.) This does not apply to my work with very narrow pulses, where, because they are TEM Waves, velocity is independent of frequency.

Last February I wrote: "Today's hijacking of the physical world by the limitations of mere mathematical analysis is disastrous".

Ivor Catt

RADIATED TRANSIENTS

Ivor Catt's article 'The end of electric charge and electric current as we know them' in EW of January 2011 was quite thought-provoking. He reported the results of a 43-year old experiment where a short sharp pulse was injected into a stripline and its progress was monitored at three locations along the line. The oscilloscope traces show quite clearly that the pulse separates out into two components. Ivor identifies these as odd-mode and even-mode currents and concludes that they are propagating at different velocities.

Such a conclusion concurs with my own reasoning that the current in each conductor can be treated as the sum of a set of partial currents. In the initial traverse down the line, these are the differential-mode current and aerial-mode current. Aerial-mode current travels faster because it is concentrated on the outer surface of the conductors where the adjacent dielectric material is predominantly air with a relative permittivity close to unity. Differential-

mode current propagates slower because it is concentrated on the adjacent surfaces of the conductors where the dielectric material is epoxy glass with a relative permittivity of about 4. Velocity of propagation decreases as the relative permittivity increases.

A different set of experiments which monitor the aerial-mode coupling between two adjacent conductors identifies the fact that quarter-wave resonance of aerial-mode current occurs at a higher frequency than the resonance of the differential-mode current (www.designemc.info section 7.5) Since resonance occurs at a higher frequency, aerial-mode current must be travelling at a higher velocity.

The scope traces reproduced in Ivor's article identify another significant feature. Pulse amplitude decays rapidly as it propagates down the line. This is because transient energy is departing from the conductors in the form of electromagnetic radiation. Since the separation between the leading edges is constantly increasing, more and more transient energy is

radiating away from the line; and less and less is being captured.

This has practical implications. Switching transients occur on power lines when any device is switched on or off. Electronic equipment is protected from the worst effects by the filters at the mains input connector. If the input impedance is capacitive, the transient current doubles and power is reflected back into the supply cable. If the input impedance is inductive, the voltage doubles. In both cases, the only place for transient energy to go is into the environment. So a high level of transient radiation is polluting the vicinity of every item of equipment for a brief period at random times. We can live with this; but for how long?

The only way of absorbing unwanted energy is to direct it into a resistance, preferably at source. So it is gratifying to learn that at least one manufacturer is including resistive components in the transient suppression circuitry.

Ian Darney