I need the authors' reply to this, below. I also need Pelosi's reply. He is "Full Professor of Electromagnetic Fields". I shall send them emails requesting replies. See them at www.ivorcatt.co.uk/x64f11.htm

Catt's reply to;

An apparent paradox: Catt's anomaly

Pieraccini and Selleri, Physics Education, IOP, 2013, pp719/720

....

The wave travels at the speed of light, c, from point x to point x + Δx in the time interval Δt = Δx/c (figure 2(c)). During this time a current I flows in the sampling volume from its left side at x, equalling

$I = \pi a^2 vqN$, (1)

where v is the drift velocity of the charges (in practice electrons, and the speed is much lower than the speed of light), q is the elementary charge (1.602×10^{-19} C) and N is the concentration of free electrons in the metal (for copper it is 8.4830×10^{28} m^{-3}).

It is very important to note that during the time interval Δt this current enters the wire length Δx through its left side, but it does not exit from the other side, as the wave has not yet arrived there. This incoming current lasts for a time interval Δt and produces in the wire length Δt an imbalance of charge ΔQ given by

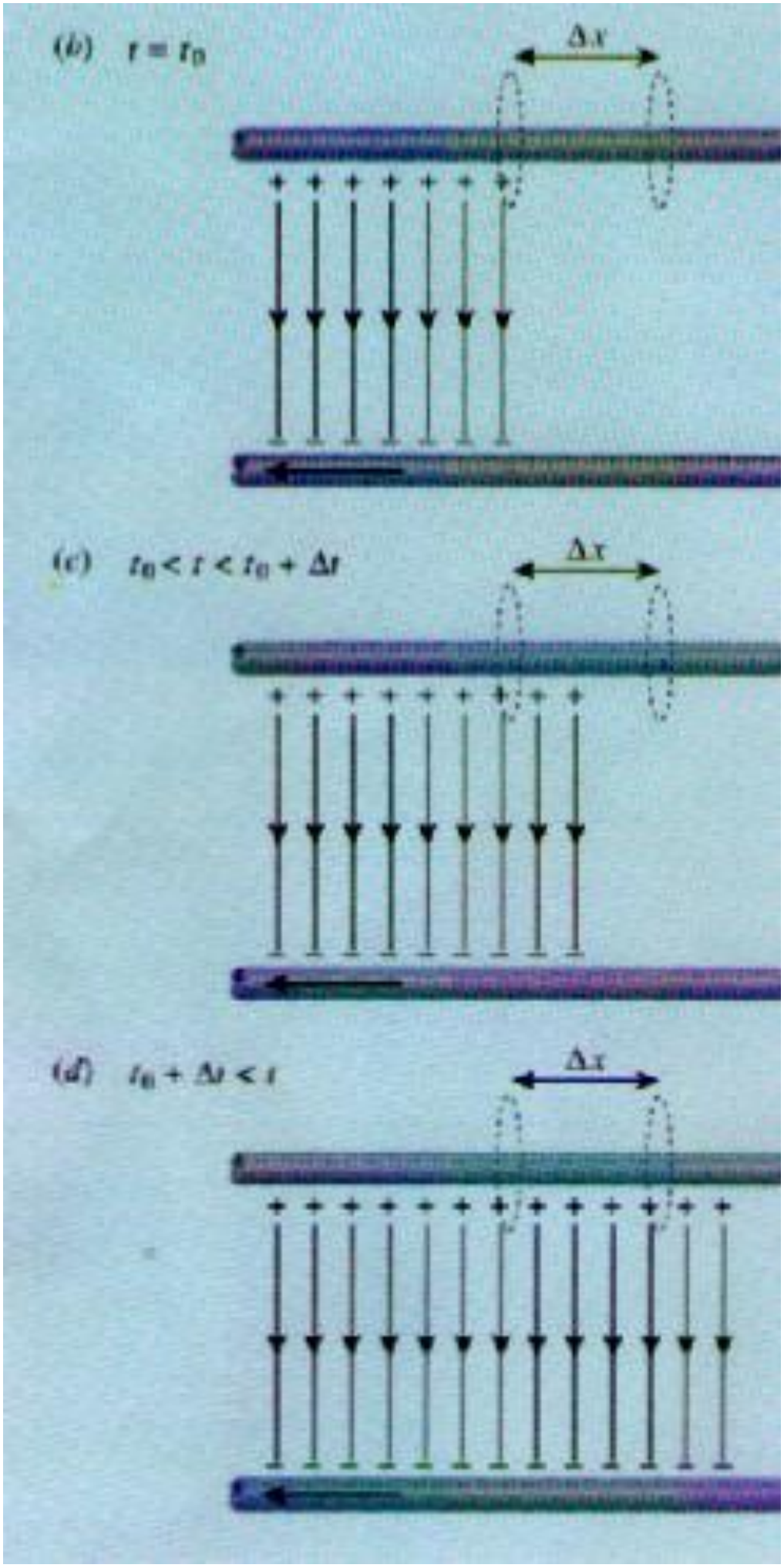
$\Delta Q = I\Delta t = I \Delta x/ c$. (2)

Since the large charge in the current travels very slowly, the resulting charge ΔQ is concentrated in a small left hand portion of the distance Δx, far away from the right hand end of the segment Δx. For current to start to flow out of the segment after Δt has elapsed, **some of the charge would have to have traversed the segment Δx at the speed of light. (Ivor Catt 15 April 2016)**

After Δt has elapsed, the current starts to flow out of our sampling volume and the charges entering from the left are balanced by those escaping towards the right.

In Figure 2(c), Pieraccini and Selleri have some of the charge travelling at half the speed of light in order to get half way through the distance Δx in time Δt. In time Δt, "the wave travels at the speed of light, c" **, so in Figure 2(c), some of the charge travelled half the**

distance travelled by the wave, travelling at half the speed of light. However, that was not fast enough. (Ivor Catt)


(b) $t = t_0$
Δx
(c) $t_0 < t < t_0 + \Delta t$
Δx
(d) $t_0 + \Delta t < t$
Δx

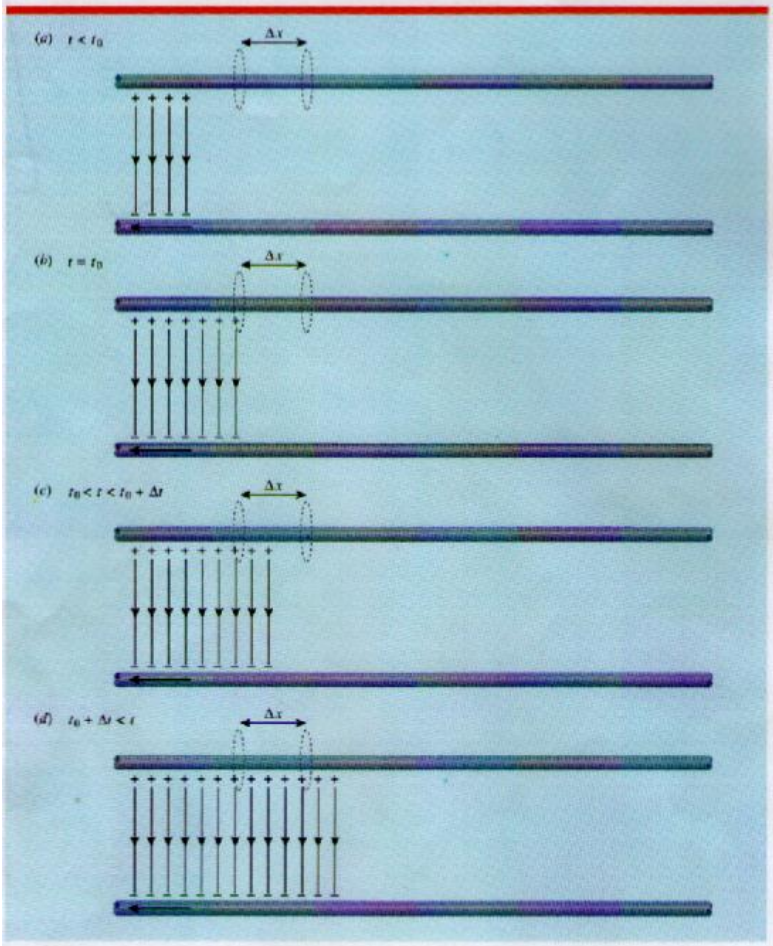
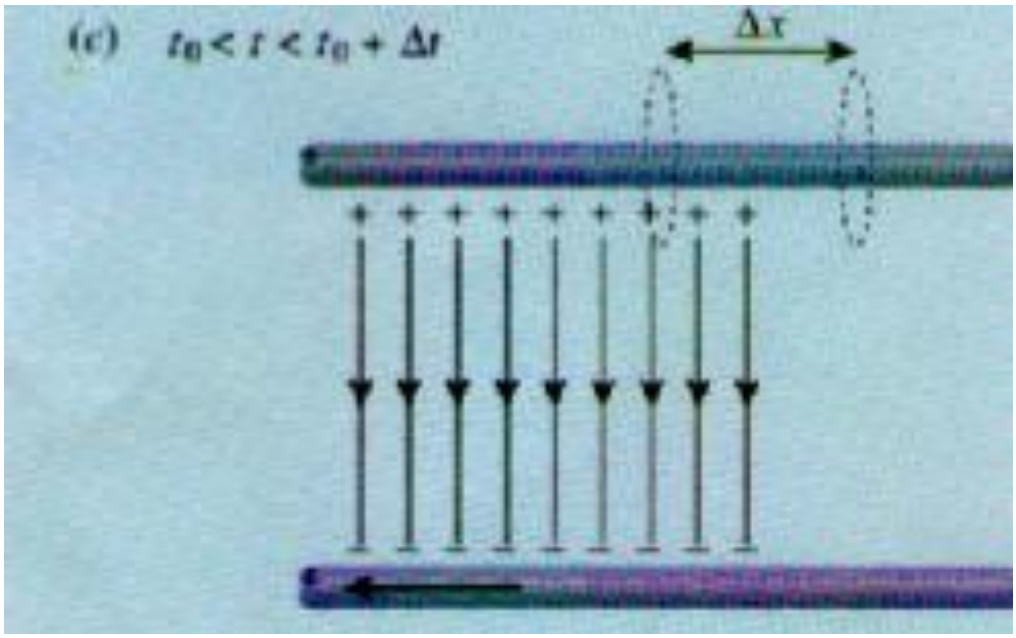


Figure 2. A wave travelling at c along a transmission line and sample volume of length Δx across the upper conductor (a). The wave arrives at the sample volume in (b); it travels through it in (c) and finally exits from the volume in (d).

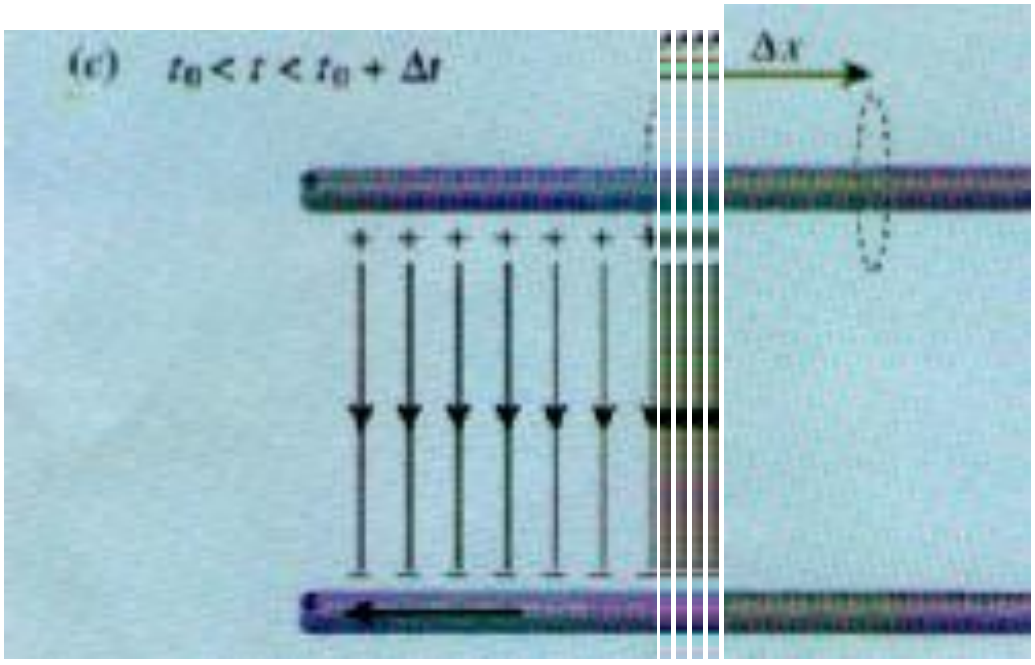
of free electrons in the metal (for copper it is $8.4830 \times 10^{28}\ \mathrm{m}^{-3}$).

It is very important to note that during the time interval Δt this current enters the wire length Δx through its left side, but it does not exit from the other side, as the wave has not yet arrived there. This incoming current lasts for a time interval Δt and produces in the wire length Δx

Figure 2(c)



When the large amount of charge enters Δx so slowly it all stays in the very narrow left hand portion of Δx. It cannot spread out over the whole section Δx , because to do so some of it would have to traverse the section Δx at the speed of light. The last, right hand vertical line terminating in a – sign will not occur, and instead many more vertical lines with many more – signs should be added in the position of the penultimate line.



After time Δt, this charge is far to the left, and current **cannot** start[s] to flow out of our sampling volume **to the right from the right hand portion of Δx.**

Ivor Catt 18 April 2016