Can DC Induction in a Coil Exist?

It has long intrigued me as to whether DC can be induced into a coil. Now we know closed electric field lines do exist in physics, if they didn't there wouldn't be such a thing as a transformer. A changing magnetic field within a core creates a closed electric field around the core so that a single turn intercepts one unit of voltage, N turns intercept N units of voltage. The unit of voltage, commonly known as *volts per turn*, is equal to the time rate-of-change of flux in the core. To get DC induction by this method requires a flux continually rising hence going to an infinite value, which is impossible. The accepted view of physics is that the closed loop integral of an electric field is either zero (for loops which do not enclose flux) or equal to dΦ/dt (for loops that do enclose flux). *No other closed loop values are allowed.*

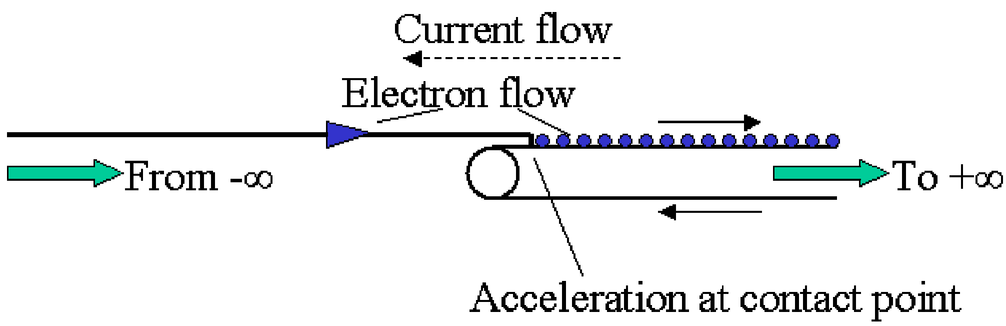

Figure 1.

Now consider the following situation. Direct Current flows in a straight line from +∞ on the right to -∞ on the left. It arrives as electrons coming from -∞ on the left flowing in a copper wire at quite small drift velocity. The electrons then pass onto a conveyor belt (like in a Van De Graff generator) to exit right at a much greater velocity, as shown in figure 1.

Conservation of charge ensures that everywhere the current remains the same. Hence the magnetic **B** and **H** field everywhere is constant. Similarly everywhere the **A** field is constant. But the electrons hopping onto the conveyor belt are accelerated, and acceleration produces radiation. So my question is "is there a constant radiated **E** field associated with the continuous supply of accelerated electrons?" Normally the radiated **E** field would be associated with a changing **A** field via **E**=-d**A**/dt, and it is generally accepted that both **E** and **A** are time retarded, i.e. they both get radiated together. But could it be that just one *thing* (the **E** field) really gets radiated, and the other *thing* (the **A** field) is just a mathematical convenience for calculation purposes, and the **E**=-d**A**/dt relationship only applies under normal Hertzian circumstances? Our conveyor belt is not Hertzian hence does not necessarily obey those rules. IMO it is quite possible that the *thing* that gets radiated is the electric field (or rather the so called virtual particles that create the electric effect).

For electrons that are accelerated over a gap that is small (considered as a discontinuity), it can be shown that the radiated static **E** field is given by

$$\mathbf{E} = -\frac{\mu_0 \mathbf{I} \Delta v}{4\pi r} \qquad (1)$$

where **I** is the current, Δv is the change of electron velocity over that small distance and r is the radial distance from the discontinuity to the field point. For simplicity, taking a rectangular closed integral of (1) as shown in figure 2 we obtain for the DC volts/turn

$$\oint \mathbf{E}.d\mathbf{l} = V = -\frac{\mu_0 I \Delta v}{2\pi} \log e\left(\frac{A+C}{B+C} \cdot \frac{R_2}{R_1}\right) \qquad (2)$$

where lengths A, B, C, R_1 and R_2 have the values shown.

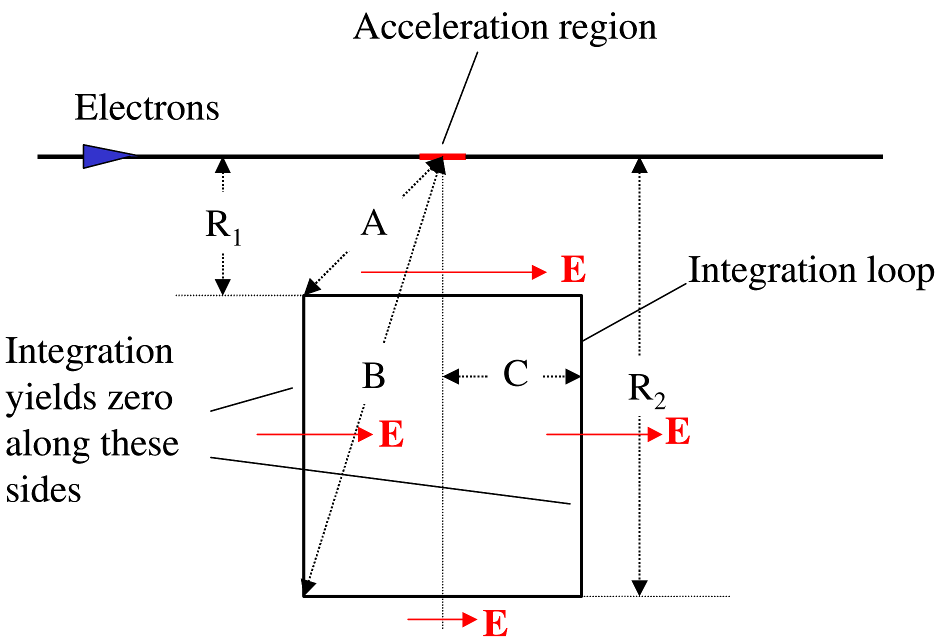

Figure 2.

Although these **E** field lines do not form closed loops (the **E** field is everywhere parallel to the acceleration) it is obvious that the integration along the side closest to the source will be greater than that along the side furthest. Also by symmetry the integration along the other two sides will cancel. Hence the closed loop integration *must* yield a voltage.

Thus science has missed a trick by claiming only $\oint \mathbf{E}.d\mathbf{l} = 0$ or $\oint E.dl = -\frac{d\Phi}{dt}$ and it should include $\oint \mathbf{E}.d\mathbf{l} = -\frac{\mu_0 I \Delta v}{2\pi} \log_e (GeometricRatio)$ as another possibility.

As a matter of interest using this DC induction against a permanent magnet must load the atomic circulating currents or atomic spin, hence one can expect to find anomalous energy somewhere. This shows up in the Marinov motor (not the ball bearing version but the one discussed by Wesley and Phipps) and the Distinti Paradox2 as anomalous DC induction into a load.