First, a brief, hurried summary of the latest developments in the subject. Details will be filled in later.

Whereas usually the electric current is said to cause the fields within a (two wire) transmission line, Olivier Hennide says, "We reverse this; the flux field (flux) travels down between the wires and causes an electric current in the wires.

We shall call the normal theory, the conventional theory, that current flows down the wires and causes the E-M field the Normal theory, or Theory N. Hennide's theory, that the field flows down between the wires and causes current in the wires we shall call Theory H.

The third, most recent theory is a step beyond Theory H and is called the Cott Theory, Theory C. In this theory, the field (flux) flows down between the wires and there is no electric current. Hennide, probably not having read this far, although it will be necessary to research his latest writings to confirm this. It is noticeable that Hennide and I think also Ford Jones has said that Hennide went mad and bored.

Gornick says his later writings should be dismissed. Gornick has dismissed the concept of energy current and the essence of Theory H and so can safely be dismissed as holding to Theory N.

To a Theory N man, the assertion that there was no electric current would lead to the conclusion that the vector was zero.

In general, what follows will be aspects of Theory C.

1. There is no electric current.
2. A capacitor is a transmission line.
3. An inductor is a transmission line.
4. A transformer is a transmission line.

The velocity of an energy current in a perfect conductor is zero. That is, energy cannot enter a perfect conductor. \( c = \frac{1}{\sqrt{\mu \varepsilon}} \), and

Capacitor

All capacitors behave as transmission lines in the same manner described for parallel voltage lines, as in my paper, IEEE Trans. Electronic Computers, Dec 1967, page 744. Because \( \varepsilon \) is so high, the actual velocity of propagation is very slow.

ESR is the initial characteristic impedance of the transmission line.
**Inductor**

Single turn inductor, iron cored.

\[ Z_0 \approx 100 \Omega \]

\[ \mu \text{ very high} \]

\[ Z_0 \approx \sqrt{f/C} \]

\[ \phi = 0^\circ \]

\[ Z_0 \text{ very high} \]

\[ \phi = \frac{1}{\sqrt{1 + Z_0/C}} \]

\[ \phi \text{ very slow} \]

since \( \mu \) is very high.

**Multi-Turn Inductor**

\[ Z_0 \approx 100 \Omega \]

\[ \mu \text{ very high} \]

\[ Z_0 \text{ very high} \]

\[ \phi \text{ still very slow} \]

**Transformer**

\[ Z_0 \approx 100 \Omega \]

\[ Z_{0, \text{core}} \approx 100 \Omega \]

\[ \phi = \frac{1}{\sqrt{1 + Z_0/C}} \]

\[ \phi \text{ very high} \]

At point P (and also at Q), reflections and standing waves occur between primary and secondary, and between windings of the transformer.

Again, follow the method for standing waves of long lines described in my IEEE Dec 1967 paper. If Xformer core is air, not iron, sensitive circuit analogy will work. For sensitive paper, take a cross section of the paper and direction of transmission lines (i.e. in y direction).
Read iron is not h hot steel iron, as the full μ does not arrive at the step or wave front, passes the material. So with read iron the story is more complex, with new wave fronts being projected from behind the original wave front as the effective μ changes (as the magnetic material domain accelerates, gain velocity 9c 9c).

Probably the best model to start with is an air core Xformer or choke, get familiar with it and proceed from there. In the more complex practical case of a slow (1 μsec) μ, that is a μ with frequency bandwidth limits 2 Ω 2734 μs.

Discussion of Xformer on last page

An initial wave front J proceeds to a change of impedance from Z0 so that there is a reflection of but some of the energy current continues towards A. If μ is large, the velocity between YX and YA is slower. At 0, reflections occur and also some of the wave front proceeds further to the right on the secondary (Yp) of the transformer.

Transmission lines can be cascaded.

Assume no fringing (i.e., imagine a coax within a coax (O)).

Keep μ, E the same for line AB & line BC.

Project a step (wave front) down AB & at the same time project one down BC. It can be arranged that the first front has currents 1a = -1b = 0 those for the second wave front 1b = -1c Total current down B is then zero.

Note B can be removed & wave fronts are unaffected. This is if stress level in end energy current is the same (Ex) (E'y)

Reflections

Wave fronts can be cascaded laterally.

The transmission line wave front rules apply to one segment (tube) of energy current just as much as the apply to the full.
An energy current moves along an imperfect conductor, to the extent that the conductor will allow it, with its own voltage drop, or the voltage drop from itself in the Theory N sense, and so effect the equivalent of a non-infinite E.

An energy current limits the real extent of its penetration of resistive transmission line wires in the same way as an overflowing river limits the extent to which it flows through the impeding brushes etc. far from its normal river bed.

The Resistor.

The energy stress, or pressure, for purposes throughout the rectangular space above and the plane itself through the same stress.

The maximum stress (Theory N voltage drop) is across the switch contacts, and the energy stress then spreads out above the switch, the stress falling away with distance.
When the switch is closed, the pressure no longer remains itself at that point and nodes down to the right as the potential suddenly (theory C) at C will be zero from 0 or E V. and a wave front moves towards R at a velocity C. If R were zero, the energy current would hit a solid wall of E = 0 and bounce back.

However, an R allows the penetration of the energy current and its dissipation in a lateral mode.

In hot, an electric conductor will not allow an energy current. E R = 0 at the conductor, with zero velocity. An R however, does accept the increase into its flow of an energy current. Inside the R the energy current becomes converted into heat.

**Electricity**

"Electric current" is the edge of an energy current, carrying more, and so does not appear in Theory C. If the edge of an energy current is sharp, "electric current" would have to concentrate into zero width, other wise.

If transmission line conductors are imperfect so that the energy current penetrates, the "electric current" spread down into

The conductor. This nearly near the edge of the energy current is not sharp. (theory C)

**Units**

The unit of energy current is the Watt.

If energy current flows through a surface, so it has a current density. The unit of energy current density is the Watt per square meter. From this we shall provisionally call the "Hermite" power. Recently said that we should once have used the great man's name for one of our fundamental field units.

This name for the power (square meter) will result to be verified by the international convention.

**Pure thoughts on the transformer**

We have a complex multiple reflection situation at P and at Q and at Load. Clearly, a low low signal at LOAD will send back reflections calling for more VP, only after alteration at Q Q at P.
The story in the case of primary and/or secondary have more than one turn.

For years I have said that the change in impedance Z0 of a transmission line is primarily a power transformer

\[
\begin{align*}
A & : 50 \Omega \\
B & : 70 \Omega \\
C & : 70 \Omega
\end{align*}
\]

A wave from 50v, 1a coming from A

\[
\frac{2 - 2}{2 + 2} = \frac{70 - 50}{70 + 50} = \frac{20}{120} = \frac{1}{6}
\]

The voltage increase at B, a 50v wave front goes back to A.

Incident power was 50v x 1a = 50watts. Reflected power is \(\frac{50}{6} \times \frac{1}{4} = \frac{50}{36}\) watts.

Power which continues back to the remainder, i.e. \(50 \times \frac{35}{36}\).

So, only 3% of power is reflected.

If further downstream there is another

\[
\begin{align*}
\text{change from } 70 & \to 50 \text{ or } Z_0, \\
\text{a further } 3\% \text{ only of the power is reflected.}
\end{align*}
\]

Generally, if \(Z_0\) changes by \(\frac{1}{x}\), power suffers stop (reflected) is \(\frac{1}{x^2}\).

[If the above worked calculation is wrong, it seems too good, or never is the time — as well as. I've found the key point in the past anyway, that very little power reflects at a reasonable discontinuity. The main effect is (my) v increases & i decreases, but power (v,i) hardly changes.]

It follows that on entering the transformer at P (Page 10) most of power continues. At Q again most power continues, only the v & i will obviously change, & it looks as if it is by the turns ratio.

When we reach the load, the normal reflection, absorption rules apply & if the load is "reasonable," most power will be absorbed. However, a short or
on the circuit will reflect 100% and
and back with its devastating news
(energy) hardly varying as it passes Q and
p, to tell the source the devil take the fate.

That is, in practice, Q points P
and Q do nothing to the passing power
(energy current) but transform its
U and i (in theory N). Of course, if
the transmission lines, Source = P and
Q = load, as identical, the transformed
power will not lightly slide down from P
load, and let the reflection along that
section will be needed. (That last sentence
is partially valid only).

Battery, electrolysis, resistor.

Electrician

Energy current is brangled sidewise, from
a battery and "walled in", or guided, by

1. A bridge of + particles can reach from one
electrode to the other. By chemical reaction, the
electrode stains half of the nearest atom.

2. The other half grabs the nearest half of the
next one, and so on down the line.
The stress in the energy current (or field)

I turn them all round, and an extra one slips into the line.

Start again.

This is a possible model, quickly conceded.
The + and - are electric charge (theory N).

Dimensional Energy Current.

Some time ago I typed out a document entitled "Electromagnetic Theory" which discussed many things, including Haeberle's ideas on the subject and including numerous quotations from his writings. It also included my 4 pp (oppose) article "The Breakdown of Learning in Electronics" which was refused publication, or fell off in some other way. A number of years ago by the IEE and the IECE. The correspondence will give the details. This current writing follows that earlier material.

If energy current is flowing from A to B, it can only flow; it cannot be picked, because energy