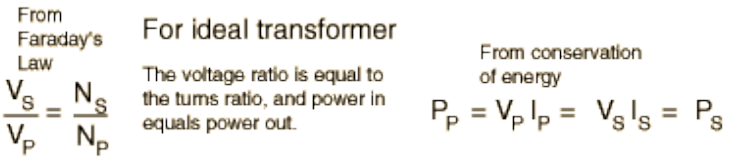
Euler's Coil Technology Experiment 5

Aim: To investigate the effect of induction Resonance.

Hypothesis A:
Transformer is a device that transferring electrical energy from Primary Coil to Secondary Coil. For an ideal transformer:



Specifically, the amount of electrical energy in a transformer system is a constant equal to its input. It is impossible to obtain extra energy by rearranging the Source and Response coils.

Hypothesis B:

In normal transformer,
First Round Induction from Primary coil to Secondary coil:
$V(Primary\ coil)=\sin(t)$
$V(Induced\ Secondary\ coil)=-V'(Primary\ coil)=-(\sin(t))'=-\cos(t)$
Notice that $\sin(t-Pi/2)=-\cos(t)$

Hypothetical Induction from Secondary coil to Primary coil:
$V(Induced\ Primary\ coil)=-V'(Induced\ Secondary\ coil)=-(-\cos(t))'=-\sin(t)$
Notice that $\sin(t-Pi)=-\sin(t)$

The description of the energy transferring process should be
$E(Original\ Primary\ coil)\rightarrow E(Induced\ Secondary\ coil)$
$E(Induced\ Secondary\ coil)\rightarrow E(Induced\ Primary\ coil)$
$E(Induced\ Primary\ coil)=-E(Original\ Primary\ coil)$
$E(Final\ Primary\ coil)=E(Induced\ Primary\ coil)+E(Primary\ coil)$
$E(Final\ Primary\ coil)=E(Primary\ coil)+(-P(Primary\ coil))$
$E(Final\ Primary\ coil)=E(Primary\ coil)-E(Primary\ coil)$
$E(Final\ Primary\ coil)=0$

Thus:
$V(Primary\ coil)=V(Primary\ coil)+V(Induced\ Primary\ coil)$
$V(Primary\ coil)=\sin(t)+(-\sin(t))$
$V(Primary\ coil)=\sin(t)-\sin(t)$
$V(Primary\ coil)=0$
$V(Induced\ Secondary\ coil)=-\cos(t)$

Generically speaking:

Given initially when V(Primary coil)=A(t) and V(Secondary coil)=B(t),
What we have at its steady state,

$$V(Primary\,coil)=A(t)-\underset{1}{n}B(t)+\underset{2}{n}A'(t)-\underset{3}{n}B''(t)+\underset{4}{n}A'''(t)-\underset{5}{n}B''''(t).....$$

$$V(Seconady\,Coil)=B(t)-\underset{1}{n}A(t)+\underset{2}{n}B'(t)-\underset{3}{n}A''(t)+\underset{4}{n}B'''(t)-\underset{5}{n}A''''(t).....$$

Original Energy content of each coil:

$$E(Primary\,Coil)=\int A(t)\,dt$$

$$E(Secondary\,Coil)=\int B(t)\,dt$$

Final Energy content of each coil(if undisrupted):

$$E(Primary\,Coil)=\int (A(t)-\underset{1}{n}B(t)+\underset{2}{n}A'(t)-\underset{3}{n}B''(t)+\underset{4}{n}A'''(t).....)\,dt$$

$$E(Secondary\,Coil)=\int (B(t)-\underset{1}{n}A(t)+\underset{2}{n}B'(t)-\underset{3}{n}A''(t)+\underset{4}{n}B'''(t).....)\,dt$$

Setup:

This experiment is divide into two group in terms of A.C power supply: transitory (T) and persistent (P), the former will have only transitory and periodic A.C power supply while later have A.C power supplied uninterrupted.
The NR-2 setup would be a normal transformer in 1:1 Primary to Secondary ratio.
The NR-3 setup would be a transformer with one Source coil then a Response coil, then yet another Source coil, the voltage variation of the input and output of the last coil is recorded.
The R-4(1) setup would be a transformer with two Source coils at the left and right while two Response coils at the middle, the voltage variation of the input and output of the last coil is recorded.
The R-4(2) setup would be a transformer with two Source coils alternating with two Response coils, the voltage variation of the input and output of the last coil is recorded.
The R-4(3) setup would be a transformer with two Source coils on the left with two Response coils on the right, the voltage variation of the input and output of the last coil is recorded.

Expected Result:

If Hypothesis A is right, then we would expect the voltage variation would only happen when its energy is supplied by an A.C source, therefore we should only observe periodic voltage variation in group T when A.C power is on. The period is controlled by the supply frequency *f*. We should expect that the output of NR-2, NR-3 and R-4(1,2,3) to be identical since the arrangement and the number of coil would not affect how the electrical energy being transferred from Source coil to the other Response coil.

If Hypothesis B is right, then we would expect little difference between the output of group P and T since the later give spaces for the infinite recursive interaction to generate enough electrical energy to sustain the system. We should also expect that the output of NR-2, NR-3, R-4(1,2,3) to be different from each other in either group since the arrangement of Source and Response coil critically affect the output. Specifically, R-4(1) is expected to yield the greatest output when compare to R-4(2,3) as two Source coil are at resonance with each other. The effect should be stronger in the T group since we left the result of interaction undisrupted by external voltage, therefore the output of (T)R-4 should be the greatest.

Result:

Discussion:

Setup P and T is use to verify the experimental hypothesis that the infinite recursive interaction do happen therefore we could replace persistent voltage supply with transitory voltage supply without affecting the function of the system (implying 'extra' energy induce in the process). The purpose of having NR-2, NR-3 setup are to demonstrate that the each recursive interaction would progress for 90 degree, thus the original input would copy itself to the fourth neighbor if there are no other Source coil in the middle. Thus, although there are identical number of Source coil and Response coils in R-4(1,2,3), only R-4:1 fulfill the aforementioned condition. We could theoretically use the same principle to enhance the electrical energy output of any transformer.