

*Electrical Engineering:*  
**Oscillations of the Electromechanical Type:**  
Looking At A Coil

I have heard as well as read many descriptions of how coils are suppose to operate. I understand that the Tesla Coil for example, oscillates at the resonant frequency based upon the coils inductance and distributed capacitance with the capacitance hat added in. Hence it behaves with normal radio circuitry concepts. It can oscillate at 1/4 wavelength of the wire length the coil is made of, however; this is very hard because the impedance really goes high and there is a required voltage transformation up even higher than would be required when the coil is allowed to oscillate in its normal manner. Allowing it to be itself is the best way to go in Tesla coil concepts.

Coils are frequently relied upon by alternative energy inventors because of the energy characteristics and reactance of the coil.

Those folk who build Tesla coils do not use the idea of the 1/4 wavelength principle (which is urban myth) rather they use the inductance and capacitance calculations to define the resonant frequency. The idea of the 1/4 wavelength principle is only used by Tesla in his coils he used for transmitters where the wire length in the coil can be added to the over all length of a long wire antenna and hence this defines a base loaded antenna set up. The capacitance hat is moved to the far end of the antenna. To fire up the spark gap a step up 120 volt AC to 15,000 to 30,000 volts AC transformer is used. Hence the voltages are very dangerous here and don't let anyone ever tell you that you can touch the arc of the capacitance hat when it is on. These coils can easily be lethal to touch. Most of the stories told in books on Tesla coils are urban myths. When a fellow reads them books and thinks he can touch the coil and dies then the authors are liable for manslaughter via disinformation. And the book writers do not know that; nor do they know that the Tesla coil can produce in the air, lethal levels of ozone. So ventilation or use in an open shop where lots of outside air gets in is best. Large Tesla coils used in buildings have to be enclosed in a room and ventilation is required to circulate in fresh air and exhaust air out. (My Public Service note of the day.) Small coils are not as bad on ozone but you can smell it

Given the understanding of this coil, I can however wonder about its ability to produce its own energy as many have claimed? This might not be myth if carefully studied. Given the size of the mass of the coil, we can wonder if it can not lend self oscillation energy to the equation if kept constantly excited?

When excitation energy is removed from the coil then for a moment it continues to self oscillate but only in micro second terms. The action then is one of a decay rate where the rate is very rapid. In our terms, to our witness of the action of turning off the switch. The coil appears to go off instantly. Actually it still has momentum in it and this can be plotted on a digital storage oscilloscope. Its collapse is too rapid for us to observe its residual momentum. This momentum is called the "fly wheel action" where a coil / capacitance circuit wants to continue to vibrate. Actually, with excitation removed, the....



coil will still oscillate at all times because of the presence of thermal energy everywhere in the universe. The energy in the unexcited coil however is very minute. Yet, it can pick up higher levels of energy from radio waves from stations operating on its frequency. It can pick up radio waves from space. Hence there is always some residual resonant energy in a coil. Even if the coil is left by itself unconnected to any circuitry in the parts box. (Now, these small levels of energy are too low for us to ever use.)

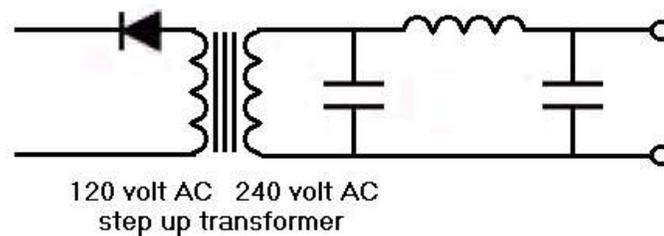
The fly wheel effect is relied upon in radio circuits of the tuning type such as is used in the Pi network of a radio frequency power amplifier. This is very important when a Class C amplifier is used. In the Class C amplifier used for AM and CW (Morse Code communications) the transistor or tube

is biased to cut off and this results in only the transistor or tube responding to the positive going half cycle of the applied analog input signal (sine wave). Hence only the positive peak portion of the signal is ever amplified. The negative going half cycle is cut off. And this actually distorts the signal. The output circuit such as the Pi network low pass tuning section that couples the rf from the transistor or tube to the antenna tuner, restores the missing negative going half cycle via its fly wheel action and this rids the wave form distortion caused by only using the one half cycle. Hence the waveform is restored to good quality. This is done via the self resonant and induced energy of the tuned circuit adding back into the equation some negative half cycle energy via the fly wheel effect. Here the tuned circuit is adding energy back into the equation equal in power amplitude but in phase 180 degrees opposite in polarity and hence the output is greater: by now being a peak to peak factor: rather than a peak or uni-peak factor. Hence, it is the use of coils that are tuned via capacitances that make this 180 degree in phase energy restoration and addition relationship possible. There is a counter induced level of electrical energy.

Look at this. If a Class C 100 watt tube plate level at 70% efficiency outputs 70 watts peak (un-directional Class C biased peak) to a tuned circuit that restores the negative half cycle via the fly wheel action: then in peak to peak terms we have 140 watts peak to peak after the tuned circuit (before circuit losses) and so go analyze that? I have seen this over and over in the world of radio for years on my oscilloscope. {...Isn't that over unity?...} Yes, of course there are real losses in the tuned circuit before the final output but still, look at it. Scratch your heads a little. So, I hear there is no such thing or never was as this thing called over unity energy? Maybe it (OU) has been around a long time but you have to know electronics to see it and be in radio, else you won't see it!

Recall the idea of using a diode to lower the heat on a soldering iron and the use of diodes with light bulbs to cut off one half cycle and lower the cost of energy usage by the light bulb? Here only one of the half cycles is being used. However there is nothing to restore the missing half cycle here. Yet there is something that can do that in the Class B and C radio frequency power amplifiers. It is that resonant Pi network coil. (Still talking about coils here.)

Get a step up 120 volt AC to 240 volt AC transformer and cut off one half cycle at the input with a diode. And then at the output use a capacitor on the secondary to resonate the 60 Hz signal and see what its voltage then is when you have nearly restored the sine wave back to looking more like a sine wave? You might have to use some filtering scheme based upon allot of fly wheel action to restore a sine wave. A Pi network even. And you should have "nearly" 120 volts at output also if you accomplish the filtering and restore a sine wave with little circuit losses. Remember here that the transformer is again, a coil.



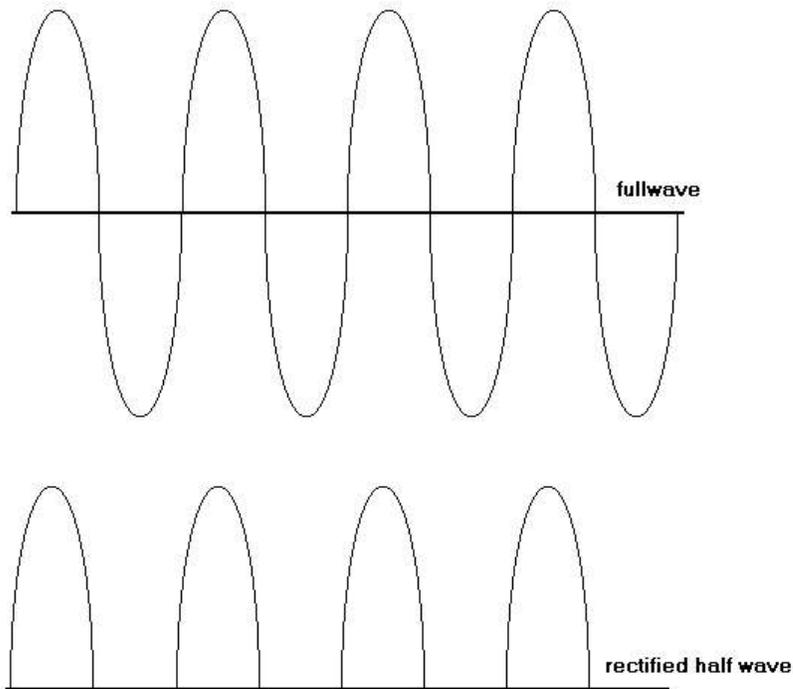
We are still talking coils.

Note: for inventors: it appears that a purely digital or square wave signal fed to a single Class B biased tube will produce the greatest peak to peak output when used with the fly wheel action of a tuned circuit. If the peak negative voltage of the square wave is set to be equal to the bias voltage of the Class B tube. What can it be used for? I do not know! An AC to AC converter? A DC to AC converter? Anyways, all of the wave form will look like a positive going pulse on the tube grid. The entire waveform will just ride inside the cut off bias level and the plate saturation level. The negative half cycle on the input grid is near the cut off point and the positive half cycle is near the saturation point.

If you make a 60 Hz AC supply out of this idea you have to use full blown coils and capacitors to tune to 60 Hz and thats a construction cost. Treat the 60 Hz signal as a radio wave and use tuned circuitry. Not them little bitty coils and caps, use big stuff. Lots of coil and lots of capacitance. Get in tune! Use concepts of maximum efficiency. Tuning is always most efficient. Now this isn't a conventional idea in the world of cheap manufacturing is it? Not like it was in the days of all made in the USA. When they use to really make things. Energy efficiency will not be achieved using less than full blown sized parts: you know that George Smith EE? What the calculations say you have to have is what you have to have and not this miniaturized stuff (junk).

Refinement of the above idea may require conditioning of the input signal it terms of pulse width or duration to effect conduction angle. If you have trouble, use a sine wave ...

and adjust grid bias for proper conduction angle to obtain best wave form at final output. Conduction angle adjustment works best when the grid is biased for Class C regions yet you may try Class B as a place to begin study. Output wave form is also conditioned by the filter circuit that supplies fly wheel action.



Use of these ideas is for investigation of possibilities and development for actual applications requires detailed study and refinements to make a realizable technology. I am not so much the author of these ideas as the compiler. Such ideas are already a part of public domain and have been used before in many areas of electronics and hence are old school. You can not get a patent on these and so anyone can manufacture a product made of these ideas. These ideas are free for use and free for you to manufacture. If anyone attempts to patent this let them know from whence the ideas originate. Free for all public use. Property of We the People 2006.

One thing missing in electrical engineering of energy devices is the use of tuned circuitry for 60 Hz electrical energy. Who knows what can be discovered if such ideas were used? Since they are not used then we may be missing a point in there somewhere. The nearest anyone comes to using tuning in 60 Hz line systems is the matter with "power factor correction" ideas. {I am looking back at making converters that are more efficient and they require line conditioning after the tuned circuit idea. Both the sine wave and the voltage level have to be maintained at output for practical use.}

Now in high voltage line systems, concepts like this come into play and they use capacitance hats there.

If you make full blown air core inductors for 60 Hz you get rid of iron core losses caused by saturation and hysteresis and have a much more energetic coil. You get lower losses and more energy out of your fly wheel action. Bottom line comment to the uninitiated EEs. We are all initiates around here.

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