Some Thoughts on the Steven Marks TPU

Having studied most of the recent Steven Marks (SM) revelations concerning the TPU, here are my latest thoughts on what it may contain.

The most telling feature is the fact that when it is operational the TPU has an inertial effect that can be felt, it has a gyroscopic feel to it. This has led some commentators to assume that internally there are rotational fields that create that effect. On the basis that the inertial property of EM photons is very weak, i.e. you need an energy transfer rate (power) of 300MW to create a reaction force of 1N, I do not subscribe to that belief. In my opinion the inertial feel comes from classical mass effects, there is some mass vibrating within the device. Vibrating mass (as opposed to rotating mass) is known to produce gyroscopic effect, indeed there are so called gyroscopes that use that very effect. So what is it that vibrates?

SM makes much of his coil or loop made of multi-strand copper wire. Can a loop vibrate? The answer is yes, of course it can. Figure 1 is a classical picture of a vibrating string, in this case vibrating at twice its fundamental resonance (the reason for choosing this harmonic will become clear). The string contains two full sine-wave standing waves. To achieve resonance the string has to be in tension.

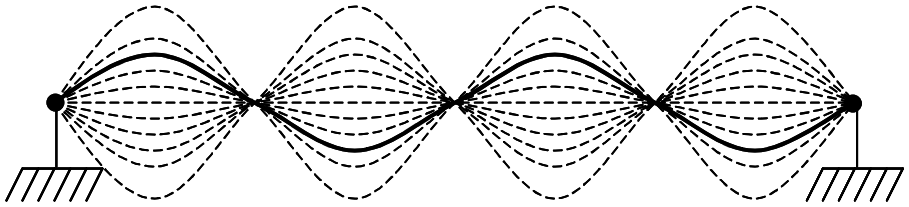

Figure 1. Vibrating String

Now consider a closed loop also in tension and vibrating at that harmonic, as seen in Figure 2. It is seen that there are four points of maximum deflection, so if we wanted things to respond to that deflection they are best placed at those four points. That concurs with SM's statement that there are four control coils around the circumference of his device.

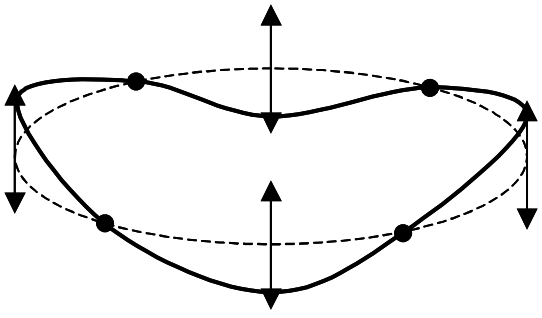

Figure 2. String in a Closed Loop

A prerequisite for the mechanical resonance is the tension in the string, and the frequency can be tuned by altering that tension. Tension in a conducting loop of wire occurs naturally when the loop is carrying DC current, but to be able to supply that the loop cannot be electrically closed. So maybe the SM loops are deliberately closed

mechanically at the point where they are open electrically, i.e. by using a non conducting solid adhesive across the gap. This could also be the point where the loop is mechanically grounded. Other support points could be at the nodes using flexible membranes. The DC bias that determines the tension would need adjusting to keep the resonant frequency at the wanted value. This is all illustrated in Figure 3.

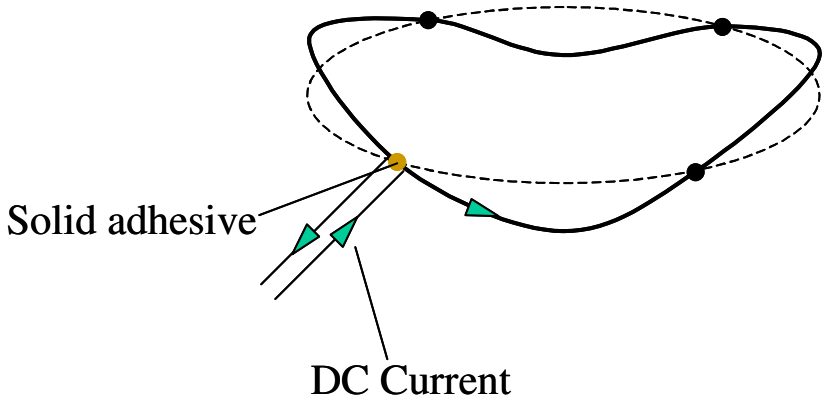

Figure 3. Loop carrying Current to create Tension

The next thing is to excite the resonance by magnetically *plucking* the string, and perhaps this is the infamous SM *kick*. To achieve a localized vertical plucking force on the current carrying wire we need a localized horizontal magnetic field pulse. This could be provided by a coil, or a set of coils, each driven with a current spike. Figure 4 shows such an arrangement and now it is seen to begin to follow the verbal description given by SM.

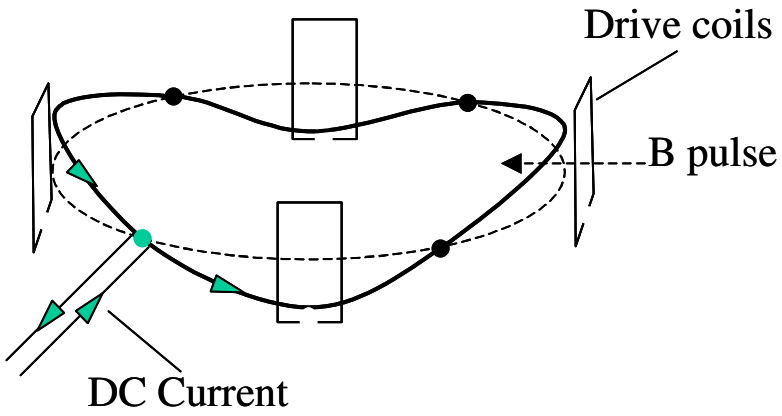

Figure 4. Driven Coils

Extracting a voltage from the vibrating wire can be achieved in many ways, but clearly that voltage will be a sine-wave. This occurs at quite a high frequency, 5KHz being mentioned by SM. Although this could be rectified to obtain DC, what is really required is a 60Hz output. It is quite possible to beat together two near 5KHz waveforms to obtain a difference frequency of 60Hz. Thus SM could have used loops vibrating at slightly different frequencies. What is now proposed is a clever way of obtaining the 60Hz while at the same time rejecting the 5KHz simply by *relative* movement between the current carrying loops and the pick-off. With two outer loops operating phase locked at one frequency, and a third central loop as the signal pick-

off, if that third loop also vibrated but at the 60Hz shifted frequency, the signal coupled to the third loop will be pure 60Hz. Coupling occurs in the regions of maximum displacement, and although at each coupling point the wires are vibrating at about 5KHz, the separation distance to the pick-off loop is only changing at the 60Hz rate.

Of course that is all speculation, but the final system bears a striking resemblance to the mental picture given by SM. It accounts for features mentioned by SM such as:

- The inertial feel of the TPU
- The use of so called *kicks*
- The need for frequency control circuitry
- The need for more than one frequency
- Three loops stacked vertically
- Four control coils per loop

What is doesn't explain is SM's statement that there are also four more control coils covering all three stacked loops. And SM's words suggest that the control coils are wound around the wire forming the loop, whereas in this scheme they are to one side.

Why this should be OU is not known, what is shown in Figure 4 is simply a rather exotic way of coupling a coil carrying DC current to a pick-off coil by varying the separation distance at the 60Hz rate. Were this to be done classically, the power taken from the pick-off coil would exactly match the mechanical power driving that separation. In this TPU version the mechanical energy is delivered smoothly during cycles of mechanical resonance, that resonance being pumped each cycle by a fast magnetic *kick*.

It would perhaps make more sense of the drive coils were placed at a point of zero deflection so that there is then zero influence on the *kick* drive current, hence no back emf to draw power from the current source. That could work if the wire were magneto-strictive so that the wire gets its mechanical impulse not by sideways force but by an internal pressure impulse. Then the drive coils *would* be wound around the wire. A resonant mechanical structure driven by magneto-striction has been proposed to explain the OU characteristic of Bearden's MEG, so maybe there is some synergy there.