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Uncertainty Principle of Mathematics

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Preface

This short paper prove that mathematically, Reality is not real . This short paper is not about Heisenberg's uncertainty principle of quantum physics. There is another uncertainty principle that depends solely on mathematical arguments and explains why our world can't be easily equated. Or more accurately can be describe in infinitely different ways all of those representations are mathematically correct. Which mean that the representation of any physical phenomena is not unique.

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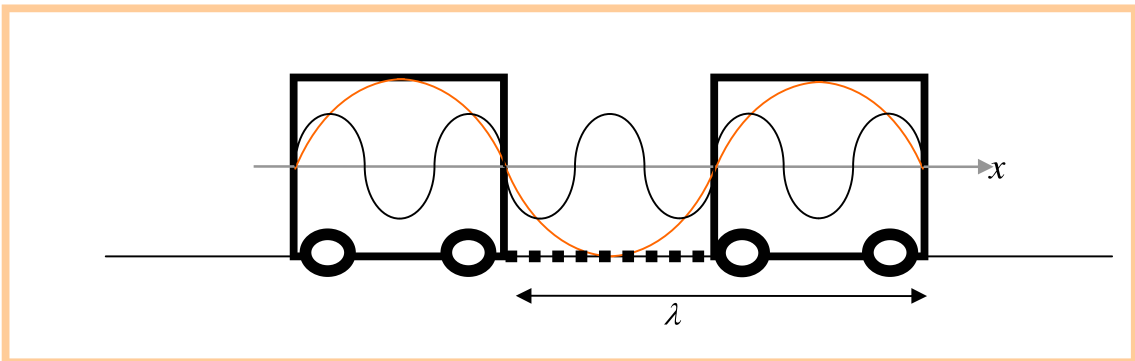
Deriving the Mathematical Uncertainty Principle

It is well known that any periodical shape has a Fourier series and non periodical shapes has a Fourier transform.

Suppose one want to find fourier series for an infinit flat train. A section of that ugly mathematical train is described in the picture below. Two components of the Fourier series are also shown; of course the number of components is infinite



Fourier series for the train are as follow

1]
$$f(x)=\frac{A_0}{2}+\sum_{n=1}^{\infty}[A_n cos(nkx)+B_n\sin(nkx)]$$
$$f(x)=\sum_{n=-\infty}^{\infty}C_n e^{jnkx}$$
$$k=\frac{2\pi}{\lambda}$$

The Fourier series in Eq 1. describe a train at rest. In order to move the train with a constant velocity v, the Fourier series will be changed as follow

3]
$$f(x-vt)=\frac{A_0}{2}+\sum_{n=1}^{\infty}[A_n cos(n(kx-\omega t))+B_n\sin(n(kx-\omega t))]$$
$$f(x-vt)=\sum_{n=-\infty}^{\infty}C_n e^{jn(kx-\omega t)}$$
$$k=\frac{2\pi}{\lambda}$$
$$\omega=\frac{2\pi}{T}=2\pi f$$

The speed of the train is given by

4]
$$v=\frac{\omega}{k}=\frac{\lambda}{T}=\lambda f$$

Phase representation $\cos(kx-\omega t)$

Now let investigate $\cos(kx-\omega t)$

$\cos(kx-\omega t)$ appears Eq 3 N times. I will show that each $\cos(kx-\omega t)$ can be represented in M different ways.

The following identities can be easily verified and is used in 3 phase electrical power line system (ELECTRIC POWER GRID)

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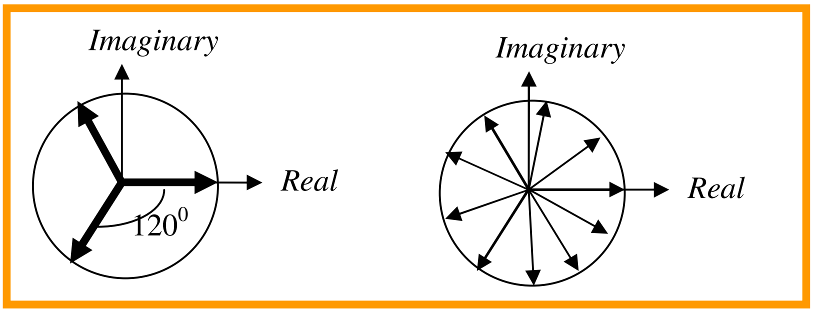
5]

$$\cos(kx-\omega t)=\frac{2}{3}[\cos(\omega t+0^0)\cos(kx+0^0)+\cos(\omega t+120^0)\cos(kx+120^0)+\cos(\omega t+240^0)\cos(kx+240^0)]$$

$$\cos(kx-\omega t)=\frac{2}{3}[\cos(\omega t)\cos(kx)+\cos(\omega t+\frac{\pi}{3})\cos(kx+\frac{\pi}{3})+\cos(\omega t+\frac{2\pi}{3})\cos(kx+\frac{2\pi}{3})]$$

In a 3 phase electrical system the phasor diagram is as in the picture below
Eq 5. is not limited to a 3 phase system.
Now, if the circle is divided into M phasors where M is an integer, and the angle between two phasors is 2π/M.
Than



6] $$\cos(kx-\omega t)=\frac{2}{M}\sum_{m=0}^{M-1}[\cos(\omega t+\frac{2\pi m}{M})\cdot\cos(kx+\frac{2\pi m}{M})]$$

The identity can be easily verified using complex variable (Euler)

7] $$e^{j(kx-\omega t)}=\cos(kx-\omega t)+j\sin(kx-\omega t)$$

From Eq 7.

8] $$e^{j(kx-\omega t)}=\frac{1}{M}\sum_{m=0}^{M-1}e^{j(kx-\frac{2\pi m}{M})}[e^{j(\omega t-\frac{2\pi m}{M})}]^*$$

* means conjugate
$(a-jb)^*=a+jb$

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Conclusion

Every term in the Fourier series in Eq 3. Is of the form

9]

$$\cos(n(kx-\omega t))] = \cos(k'x-\omega' t)] = \frac{2}{M}\sum_{m=0}^{M-1}[\cos(k'x+\frac{2\pi m}{M})\cdot\cos(\omega' t+\frac{2\pi m}{M})]$$

$$\omega' = n\omega$$

$$k' = nk$$

and M can be any integer $\{1 < M \le \infty\}$

Since the number of terms in Fourier series is N, the number of combination with M is $M \cdot N$ and since

10]

$$M \to \infty$$
$$N \to \infty$$

The limit is of the order of $\aleph_0$

11]

$$M \cdot N \to \aleph_0$$

Now, suppose we are sitting in the cinema and staring at a train moving on the screen. Of course the audience knows the train is not real because they bought a ticket to see an illusion in the cinema, and what they see is light waves coming from the screen. At the end of the film, the audiences go out to the real world and looks around and see light waves coming from objects around them. There is no difference between the light coming from the screen and from the real word. Mathematically in both cases we use Fourier to describe both cases and I proved that the mathematical number of representations is infinite. Now may be that the audience themselves are produced from another cinema projector so that they are also not real. And the number of ways to make reality not real is at least $\aleph_0$

Comments

What is presented in this paper seems to be useless but it is not.

One of the complicate theories in electrical engineering is: **"The unified theory of electrical machines"**. The most popular solutions to this theory was given in a thick book **"The unified theory of electrical machines"**. Written by [Charles Vincent Jones]

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Jones used Matrix and Tensors and more than 300 pages to prove this theory.
In order to solve the same theory **"The unified theory of electrical machines"**
I use only Eq 6 and the theory was derived in about 10 pages (not 300 pages)
My proof to **"The unified theory of electrical machines"** is found on the internet at
http://vixra.org/abs/1206.0078
and another paper at
http://vixra.org/abs/1206.0066
If Eq 6 was useful in solving **"The unified theory of electrical machines"** it will be useful in solving many other problems.

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