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# ABOUT THE STRUCTURE OF THE PLANCK'S CONSTANT

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ABSTRACT; Currently, two theoretical value of the Planck's constant are known. One explains empilical value, and the other one explains it of vacuum space. In this paper, I explain the relationship between these currently known two theoretical values.

## 1.Theoretical value of the Planck's constant of vacuum space

### *1.1 Calculation of the Planck's constant of vacuum space*

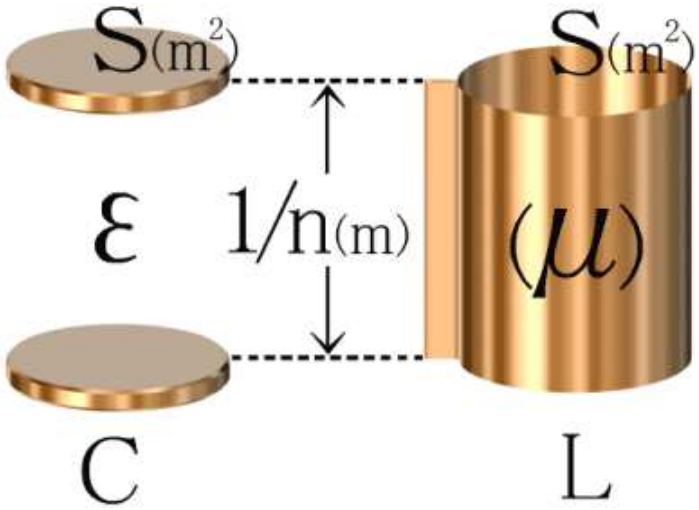


**Fig.1.** Supposed size of C and L

Planck's constant is the most important constant in the system of quantum mechanics[1]. It is known as empilical value, but I discovered a way to calculate theoretical value of this Planck's constant of vacuum space.

First, suppose capacitance and inductance in the medium and electromagnetic wave oscilates by reasonance. Their size are shown in above **Fig.1**.

When voltage of capacitor was V(volts) and electric current of inductor was I(amperes), their energy become following;

$E_C=CV^2/2$

$E_L=LI^2/2$

Therefore, for $E_C=E_L$,

$V/I=(L/C)^{1/2}=Z$ .....(1)

Z is the impedance of medium.

And in general, frequency of oscilation f becomes, $f=1/(2\pi(CL)^{1/2})$. New value of *f* becomes following to substitute Z of equation(1) into this equation.

$f=1/2\pi CZ$

Then, calculate $E_C/f$. In this calculation, providing that electric charge CV be equal to the elementary electric charge "e" because we are thinking about "a photon".

$$\mathbf{E_C/f = 2\pi^* CZ * CV^2/2 = \pi^* (CV)^2 * Z = \pi e^2 Z \ (=h)} \quad .....(*)$$

This is the theoretical value of the Planck's constant of vacuum space. This value becomes about $3.037045883*10^{-35}$.

Especially, "eZ" is showing elementary magnetic charge. So if this value were defined as "**e**", value of the Planck's constant of vacuum space becomes following;

$h = \pi e\mathbf{e}$ (C*Wb)

It is curious that this result is showing "*J*s = C*Wb*". Universe was characterized by "electric" and "magnetic" charges.

Vibration of electromagnetic wave(reasonance quantum) is shown in the following figure.

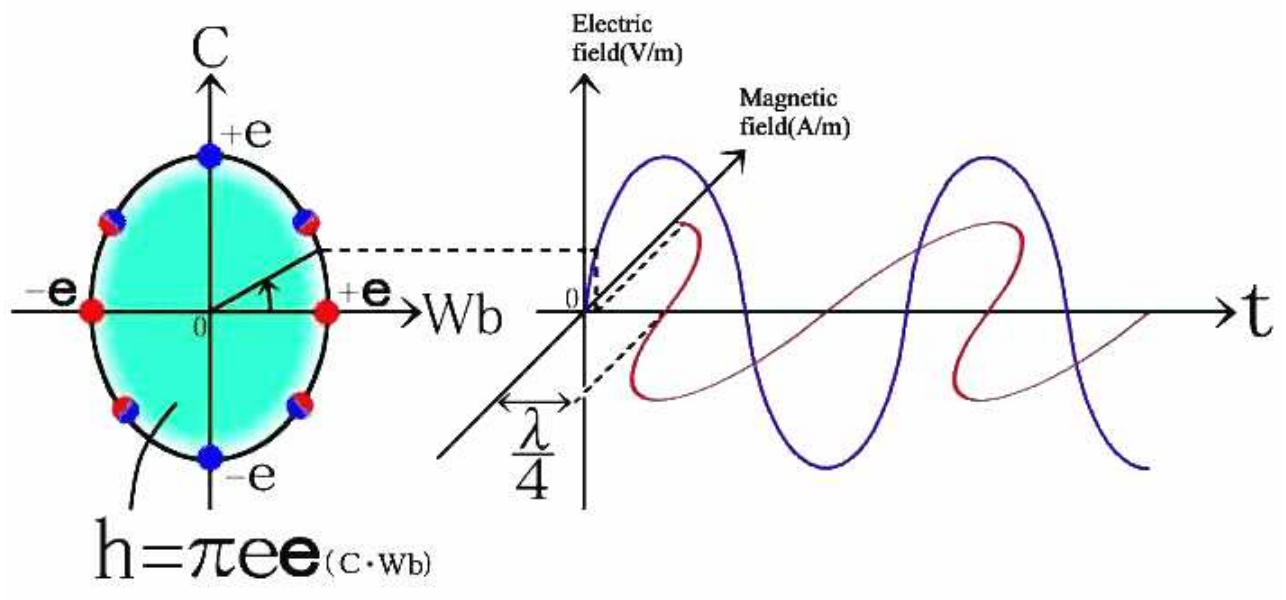


**Fig.2.** Vibration of resonance quantum

*1.2 Size of the reasonance quantum*

To calculate the size of resonance quantum is not difficult.

I supposed λ/2 to be equal to 1/n(m) for the begining of all. Because the length of dipole-antenna

is λ/2(m), and voltage vibrates along it. Then, calculate the size of resonance quantum to begin with S. In this calculation, "*c*" is defined as the lightspeed in the medium.

$(\omega=)\ 2\pi f = 1/(CL)^{1/2} = 1/nS(\mu\varepsilon)^{1/2} = c/nS = \lambda f/nS = f\lambda^2/2S$

$\therefore S = \lambda^2/4\pi$

From this result, the radius "R" of the column of resonance quantum becomesλ/2π, and the length of circumference "c" comes to be equal to λ. This is the size of resonance quantum(**Fig.3**).

I think the electromagnetic wave is a kind of resonance quantum, and it alters its energy between magnetic and electric energy.

If this presupposing is true, the magnetic field and the electric field must vibrate with shifting their phase π/2. It means that each coordinates where magnetic and electric field become maximum at the same time must have the discrepancy in position, which is λ/4 (m)(**Fig.2**).

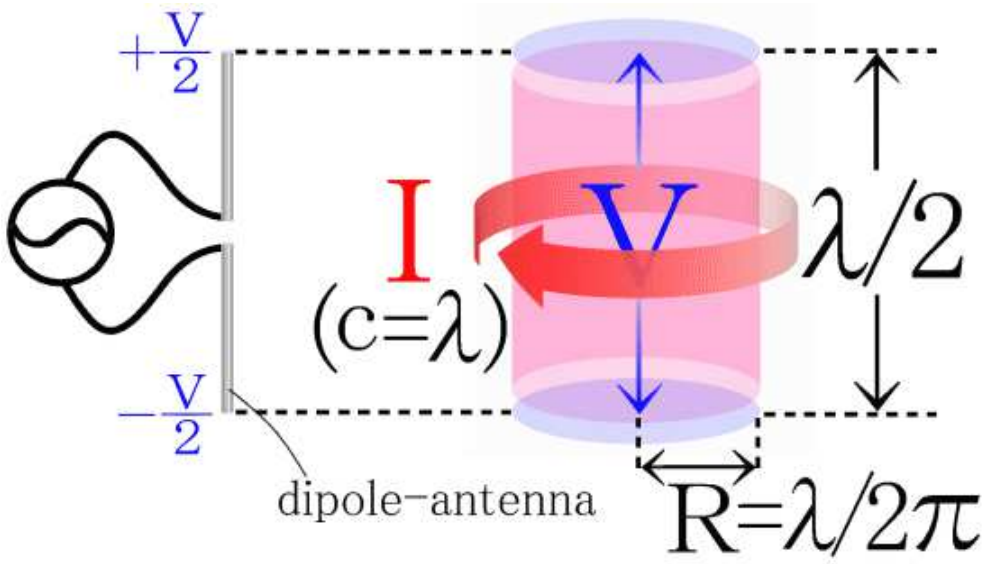


**Fig.3.** Size of resonance quantum

## 2.Analysis about the two Planck's constants

According to the study about the theoretical value of the Planck's constant discovered by professor van der Togt[1], the theoretical value which is showing the empilical value of the Planck's constant is, $h=12^3e^2/8\pi\varepsilon_0 c \rightarrow h=12^3e^2Z/8\pi = (12^3/8\pi^2) * \pi e^2Z$. "$\pi e^2Z$" is the body of the theoretical value of the Planck's constant, and "$12^3/8\pi^2$" is the "van der Togt's coefficient".

## 3.Conslusion

Someday, the third theoretical value which appears in the sze of quarks will be discovered. I am expecting its form will become "coefficient * $\pi e^2Z_0$".

## Reference

[1]Wikipedia, "Planck constant", https://en.wikipedia.org/wiki/Planck_constant
[2] van der Togt, Carel. March 1, 2006 "Quantum Mechanics and the Ether: The Theoretical

Derivation of Planck’s Constant "
(http://gsjournal.net/Science-Journals/Research%20Papers-Quantum%20Theory%20/%20Particle%20Physics/Download/1177)