# Physical space of No-Shape-Substance

—— The Third Part of New Physics

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**Abstract:** People used to establish physical laws on the mathematical frame directly, without considering the existence of the No-Shape-Substance. We believe such physical laws are separated from their nature.

Since we have known something about the No-Shape-Substance, we must review physical laws on the ground of objectivity and reality.

We will discuss more profoundly space, universal gravitation, Coulomb force, magnetic force, the theory of relativity, and the like. We are trying to make basic physical laws more exactly and more clear.

There is a general presentation to No-Shape-Substance in this paper, as well as an elementary calculation of the density and volume modulus of No-Shape-Substance. On the ground of the calculation, we can get a profound understand on the influence of medium on the velocity of light and that of temperature on the refractive index.

**Keywords:** Universal Gravitation, Field, Space, Wave-Particle Duality, Big Bang

## 1 Universal Gravitation and Coulomb Forces

We know, macroscopically, only through a certain body can the interactive forces travel among different objects. Similarly we know that the universal gravitation between the objects as well as the Coulomb force between the electric charges, cannot travel unless through a certain tangible body.

Now since we have learned what the No-Shape-Substance is, we conclude that the universal gravitation between any two objects travels through the No-Shape-Substance;

and also the Coulomb force between any two electric charges also travels through the No-Shape-Substance. [1, 2]

……

*To measure the gravitational constant between any two objects, scientists conducted geophysical experiments in the vacuum in the sea, mine well or drill well. The obtained constant is higher than the value measured in the laboratory on the earth's surface. The gravitational constant they got in laboratory was* $6.67259\times10^{-11}m^3kg^{-1}s^{-2}$, *while the average value of geophysical measurements is* $6.730\times10^{-11}m^3kg^{-1}s^{-2}$.

*The difference between these two measured values has been puzzling the scientists since both are measured in an environment of vacuum.* [3, 4]

……

Well, what caused the obvious difference between the two measured values on earth? We believe it was caused by the different densities of the No-Shape-Substance. As stated above, the universal gravitation between any two objects is propagated by the No-Shape-Substance. However, the magnitude of the universal gravitation between any two objects associates with the density of the No-Shape-Substance where the two objects are located. Because the general distribution of the matter constituting the earth is closer to the vacuum space that exists in drill well, in mine well or in the sea, and the density of the No-Shape-Substance in such vacuum space is larger than that in the laboratory on the earth's surface, the corresponding constant in such space is a little larger.

Is there magnetic charge in nature?

Some people have been exploring the problem.

In my opinion, there are no magnetic charges in nature and the magnetic force is the interaction among the electric charges that move relative to the No-Shape-Substance Space.

Here we take a familiar example. When two boats move side by side in the same direction in a river, the stream of water there will produce a force to push the two boats closer, but such force will not arise when the two boats are at rest in the water.

When the electrical charges are at rest in the total No-Shape-Substance Space, there exists only the Coulomb forces among them and the magnetic forces will not exist among them. However, when the electric charges move relative to the total No-Shape-Substance Space, magnetic forces will arise among them.

When the electrical charges are at rest in the total No-Shape-Substance Space, it cannot produce magnetic field; but when the electric charges move relative to the total No-Shape-Substance Space, there will be a magnetic field.

The vibration of an electric charge will cause the vibration of the No-Shape-Substance around it and thus produce electromagnetic wave.

## [Is a Field a Substance?]

Nowadays there is a popular belief that a field is just a substance. Many people believe this kind of rationale. But in fact it's still a problem of indistinct on physical concepts.

Taking electric field for example, what's the definition of the electric field strength $\vec{E}$ ?

If a probing point electric charge of $q_0$ feels an electric force of $\vec{F}$, then the electric field strength $\vec{E}$ at this point is defined like this:

$$\vec{E} = \vec{F} / q_0$$

That is, the electric field strength $\vec{E}$ at a point in the space equals to the electric force acting on a unit positive charge.

There will be electric force acting on a unit positive charge. Does it exist without the charge? Of course not. So the electric field is the mathematical description of electric forces that a unit positive charge feels at different points in the space.

Because of the force among charges, the definition of electric field came into being. But when people were asked why there were forces, they answered that it was electric force, being assured and bold with justice.

What a simple error on logic they have made!

As shown in figure 1, People's understanding of the market is wrong, like a snake

swallowing its own tail, this is the simplest logic loop error.

How does the Coulomb force among electric charges act? How does the universal gravitation among bodies act? All these interactions are propagated by the existent No-Shape-Substance.

**Fig 1 snake swallowing its own tail**

## 2 Substantial Space and Mathematical Space

What is space? Space is just like a great container wherein all the matters in the universe are located.

*Plato has said that 'Space, as a third party besides existence and changes, is existed before the existence of the world. ……It is like a matrix that supplies a concourse for the formation of everything on earth.'*

*Newton has ever said that 'The absolute space will never change or move. It's the nature of the space. It is an independent aseity and has nothing to do with other things.'*

Space, time and substance are all the basic objective elements existing in the universe. Space is another being out of substance; it is the place where substance exists.

Length is a measurement of space while a reference frame is a description on it.

How can space bend if there is nothing in it? Furthermore, how can space change its status because of movements of other things?

We have given these concepts in our previous discussions. The space in which the No-Shape-Substance exists is called the No-Shape-Substance Space or the Substance Space for short. Opposite to the No-Shape-Substance Space, we call the virtual and flat space in classical physics the Mathematical Space.

The No-Shape-Substance can move relatively to a mathematical space reference frame. That is, the Substance Space can move relatively to it.

But all the motion laws of all bodies depend on the total No-Shape-Substance space where it exists; they do not depend on the absolute space.

## [Newton's Bucket Experiment]

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*Newton had ever demonstrated the existence of the absolute space with his famous water bucket experiment. The experiment works like this,*

*When the bucket which was filled with water rotated but the water inside it didn't move, the surface of the water is a plane as if the bucket was not rotated. But at last there appeared a concave on the water surface when the water inside the bucket rotated together with the bucket. The experiment indicates that the water surface remains a smooth plane when the water is immobile no matter whether the water moves relatively to the bucket or not. But the water surface remains a concave when the water rotates regardless of its state relative to the bucket.* [5]

If we set up a mathematical reference system on the internal wall of the bucket, the physical law will conflict with the experimental fact.

*1) At the beginning, the bucket had rotated but the water inside not. The water rotated relative to the reference frame in which the bucket was, so the water was acted upon by a centrifugal force, and the water surface should be a concave. ——But in fact, the water surface in this case remained flat.*

*2) When the water inside rotated with the bucket, there is no relative motion to the reference frame in which the bucket was. The water was not acted upon by a centrifugal force, so the water surface should remain flat. ——But in fact, the water surface became concave.*

*In the face of such a conflict, Newton said that, this just proved the existence of an absolute space. According to the water surface being flat or concave, we can determine whether the water is immobile or rotational relative to the absolute space.*

We say that physical laws of a body depend on the total No-Shape-Substance space where the body is located, but do not depend on the absolute space.

Then how should we interpret Newton's water bucket experiment?

As we all know, the density of the No-Shape-Substance in the water bucket is very small as compared with the density of the No-Shape-Substance of the earth. Therefore, whether the bucket is moving or not, it exerts little influence on the total

No-Shape-Substance .The total No-Shape-Substance can be completely denoted by the No-Shape-Substance of the earth.

When the water in the bucket doesn't rotate with respect to the earth, it does also not rotate with respect to the total No-Shape-Substance Space. Therefore, the water in the bucket is free of any centrifugal force and as a result the surface of the water remains a plane.

But when the water rotates relative to the earth, it also rotates relative to the total No-Shape-Substance Space. At the same time, the water will be acted on by a centrifugal force and thus the surface of the water appears concave.

## [Do Physical Laws Depend on Mathematical Reference Frame?]

As shown in figure 2. We analyze the forces acting on electric charges *A* and *B*. If we associate the physical event with the space reference frame, there will be contradictions.

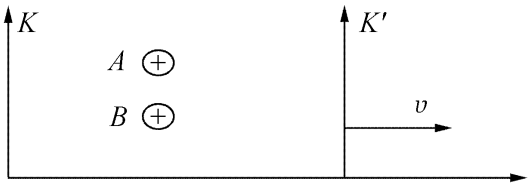


**Fig. 2 the contradiction between two electric charges and the relativity theory**

According to the theory of relativity, physical laws have the uniform format in all inertial reference frames. Then, when observing in the reference frame of *K*, electric bodies *A* and *B* are both immobile, and there are only coulomb forces between them. But when observing in the reference frame of $K'$, electric bodies are moving. There are not only coulomb forces between them, but also magnetic forces.

Experimental facts can only have one result. That is, the forces between the two electric bodies at a certain time are objective and unique. Obviously, the two judges before are contrary to each other.

In addition, when observing in the reference frame of $K$, electric bodies *A* and *B* are both immobile, both of them can not generate magnetic field. But when observing in the reference frame of $K'$, electric bodies are moving, and both of them generate magnetic field.

Experimental facts can only have one result. That is, the ability for the two electric bodies to generate magnetic field in space is objective and unique. Obviously, the two judges before are contrary to each other.

If only we associate physical laws with the No-Shape-Substance space where the body is, physical laws would be more objective, natural and harmonious.

## [The Simplest Logic and Experimental Facts]

Let us look at the basic physical facts as follows.

The electric charge that is stationary relative to the earth's surface doesn't produce magnetic field, while the moving one produces it.

If the physical laws are built on the reference frame and the theory of relativity is right, we get the following conclusion. That is, the electric charge that is stationary relative to the inertial reference system doesn't produce magnetic field, while the electric charge that is moving relative to the inertial reference system produces it.

Well then, we analyze a simplest problem according to the theory of relativity. That is, does the electric charge produce magnetic field, when it moves relative to the earth's surface?

It is moving to the reference system of the earth's surface, so it produces magnetic field. But it is immobile to the reference system of itself, thus it can't produce magnetic field. Well then, whether it produces magnetic field or not? Obviously, they are incompatible mutually.

Professor Zhu Yongqiang from Department of Physics of FuDan University in Shanghai, conducted some experiments on this problem. The experiment is as follows.

*In the experimental installation, an observing system was made to be stationary relative to a charged body. We would probe into that if there was a magnetic field existing near the charged body, when the observing system and the charged body moved at the same speed or acceleration.*

*When the experimental installation was at rest on the earth's surface, the magnetic signal received was zero. But when it moved at a uniform speed relative to the earth's surface, the magnetic signal received was considerable***.**

According to the theory of relativity, the charge that is at rest in an inertial reference system cannot produce magnetic field.

But in the experiment, the observing system that was stationary relative to the charge had detected a magnetic field, when the charge moved relative to the earth's surface.

*Another experiment on smashing electromagnetic wave conducted by Professor Zhu Yongqiang is like this,*

*In this experiment, Professor Zhu Yongqiang made an exact instrument. It mainly included a transmitting device and an amplifying-receiving device. The transmitting device could produce smashing electromagnetic wave, and the amplifying-receiving device could display the strength of the received smashing electromagnetic wave.*

*The receiving strength was independent of the direction of the instrument, when the installation was stationary on the earth's surface. But in a moving reference system, the receiving strength had much to do with it.* [6]

## [Cosmic Background Radiation and the New Ether Drift]

This experiment was conducted by Lawrence Berkeley National Laboratory in the year of 1976 to 1977, using an U-2 airplane at a height more than 15000m.

*A wonderful radiation that bathes the earth almost uniformly from every direction has turned out to be a unique source of information about the nature and history of the universe. The isotropic three degrees Kelvin radiation is a background which all astrophysical objects lie on.*

……

*It is known that the three degrees Kelvin background radiation varies by about a tenth of a percent across the sky, with the hottest region being in the direction of the constellation Leo and the coolest in the direction of Aquarius. The temperature varies smoothly between these two regions, following a simple cosine curve. This distinctive pattern ("the great cosine in the sky") leads us to identify the velocity of the solar system as the cause of the anisotropy.*

……

*There can be only one inertial reference frame in any region of space where the background radiation is completely isotropic. In any other reference frame an observer's motion will reveal itself as a variation in the temperature of the radiation proportional to the velocity of the observer and to the cosine of the angle between his direction of motion and the direction of observation.*

*Physicist P.J.E.Peebles created the term "the new ether drift" to describe the expected motion.* [7]

……

The above experiments and plenty of electromagnetic facts all illuminate that physical laws cannot be established on the vain mathematical space reference frame.

What is a reference frame? It is just a mathematical model used to solve problems. It is not in existence. Is there any inevitable relation between physical laws and mathematical space reference frame?

It is an essential error of physics to establish physical laws on a vainly mathematical space reference frame. So we must throw away this farfetched relation. If only physical laws were established on the foundation of matter, physical laws would be more objective and natural.

## [Why are the Kinetic Energies not Equal?]

As shown in figure 3. The reference frame $K'$ moves in uniformly rectilinear motion relative to the reference frame *K*. The two bodies *A* and *B* also move in uniformly rectilinear motion.

The mass of *A* is 4*m*, and its velocity relative to the reference frame *K* is $\upsilon$. While the mass of *B* is *m*, and its velocity relative to the reference frame K is $2\upsilon$.

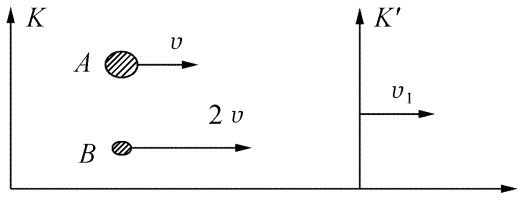


**Fig. 3 the study on the kinetic energy in different reference frames**

When observing in the reference frame *K*, we get the kinetic energies of *A* and *B* respectively as follows,

$$E_A = \frac{1}{2} 4mv^2$$

$$E_B = \frac{1}{2} m(2v)^2$$

The kinetic energies of *A* and *B* are equal in the reference frame *K* .But they will be unequal in the reference frame $K'$.

If $v_1 = v$, the velocity of the body *A* relative to the reference frame $K'$ is zero, while that of *B* is $v$, then, the kinetic energies of *A* and *B* are respectively,

$$E'_A = 0$$

$$E'_B = \frac{1}{2} mv^2$$

It is obvious that the kinetic energies of *A* and *B* are not equal in the reference frame $K'$.

The kinetic energies of *A* and *B* are equal in the reference frame *K*. But it will be not in the reference frame $K'$. Then how should we measure the kinetic energy of a body?

As we have known, I have given an explicit definition for kinetic energy of bodies. The kinetic energy of a body is the energy it has, when it moves relatively to the total No-Shape-Substance where it exists. There will absolutely not be different meanings as above in my theory.

## [Absolute Space and Inertial Reference Frame]

Actually, the concepts like absolute space are abuse of classical physics. It is a product to deal with physics mathematically.

Do movement laws of a body have inevitable association with the virtual mathematical reference frame?

Movement laws of a body depend on the total No-Shape-Substance space wherein the body is located. Concepts like inertial mass, kinetic energy and momentum of a body, are strictly defined against the total No-Shape-Substance space where the body exists. They can have clear physical meaning relative to the total No-Shape-Substance space where the body exists.

——If absolute space exists, the total No-Shape-Substance space where the body

exists, will be the absolute space that movement laws of a body depend on.

Well then, is the reference frame moving in a uniform motion relative to a total No-Shape-Substance space an inertial reference frame?

Note that inertial mass, kinetic energy and momentum of a body have something to do with not only its speed relative to the No-Shape-Substance space but also the density of the No-Shape-Substance.

As a result, physical laws will have a different form in a reference frame that has a uniform motion relative to a total No-Shape-Substance space. Well then, the so-called inertial reference frame is also a product to deal with physics mathematically. It has no meaning at all.

If only we rethink physical laws carefully on the ground of matter, on the ground of objectivity, nature and reality, all physical laws would become more natural, real and exact.

## 3 Brief Analysis and Explanation on the Four Validating Experiments of General Relativity

I do not want to comment the general theory of relativity too much. Einstein's starting point is good, because he tried to link the laws of physics with the objective world, and that is very good progress.

However, his treatment is far-fetched, because he uses mathematical treatment of physics, on the basis of the Universal Gravitation and the acceleration are exactly the same、gravitational mass and inertial mass are exactly the same、changing the objectivity of time and space!

Do Universal Gravitation and acceleration equal to each other completely? Do gravitational mass and inertial mass equal to each other completely? And who can say that space is curved, time is chaos and no standard?

I have two questions. When the light passes through a glass, sphere of light deflection occurred, and if we can say that the space is curved?

As we all know, the speed of light in other medium such as glass and water is

lower than that in a vacuum, and if we can say that the space is curved?

Frankly speaking, the general theory of relativity still substitutes the mathematical disposal for exploration to physical essential laws.

## [Gravitational Frequency Shifting]

We say a photon has its mass of $m_0 = \frac{h\nu}{c^2}$.

When a photon is emitted by a star with great mass, the negative work done by gravitation is greater, so the energy of the photon is reduced. Moreover, $E = h\nu$, so the reduction of the energy of a photon will give birth to a reduction of its frequency. This is the so-called gravitational frequency shifting.

## [The Bending Effect of Light]

When a light beam travels near the sun, it will feel the attraction from the sun because photons have mass. So the light beam will curve. Note that the magnitude of the gravitation on a photon from the sun relates to not only the mass of the sun, but also to the density of the No-Shape-Substance near the sun.

Moreover, the spherical distribution of the No-Shape-Substance near the sun will act as a lens. This can also make the light beam curve to some extent. Of course, the rotation of the No-Shape-Substance space near the sun can also affect the propagating direction of the light beam.

## [Precession of the Perihelion of Mercury]

The total No-Shape-Substance space where Mercury exists will be affected by the rotation of the sun, because of a shorter distance between Mercury and the sun. The orbit of Mercury will also be affected by the rotation of the total No-Shape-Substance space.

## [The Time Delay in the Propagation of Radar Wave]

*The observers on the earth's surface made a beam of electromagnetic waves propagate back and forth through by the surface closest to the sun where its distance R from the sun is about $10^6$ kilometers, and at the same time they also made another beam*

*of electromagnetic waves propagate back and forth through by the distant space from the sun where the distance R from the sun is about $10^8$ kilometers. These electromagnetic waves are incident upon Mercury or Venus and then are reflected again. We calculated their to-and-fro time difference and as a result we found that the light traveling near the sun would be delayed.*

……

Why did such time delay happen? Having acquired the knowledge I presented in previous sections, we can answer this question very well.

Because the density of the No-Shape-Substance nearer the sun is larger, the velocity of the electromagnetic waves traveling nearer to the sun should be smaller. As the density of the No-Shape-Substance farther from the sun is smaller, the velocity of the electromagnetic waves as a result should be larger. Therefore compared with the electromagnetic waves propagating farther away from the sun, those propagating near the sun were delayed.

## 4. Big Bang

*When observing the remote star, people find a ubiquity of red shift of the spectral line and the quantum of red shift is proportional to the distance between the star and the earth.*

*People believe that the red shift of the spectral line is generated by Doppler Effect, and stars are apart away from one another. Furthermore, people deduce that the universe is produced by Big Bang.*

……

Frankly speaking, I can’t agree with the idea of Big Bang.

Well then, how does the red shift of the spectral line come into being?

I believe it is mainly because of the attenuation of energy.

The level of energy of a photon will sure fluctuate in its propagation.

The propagation of the photon causes the No-Shape-Substance to vibrate slightly, so the photon will lose a little energy. The losing energy is greater when the distance the

photon travels is longer.

When the distance that the photon travels is very near, the reduction of the energy can't be put up. But when the distance is very far, this reduction will be obvious.

The energy of the photon is $E = h\nu$. When the photon travels a long distance, the lost energy will express itself on the frequency. So the observation to all the stars will find the phenomenon of red shift on the spectral line. Moreover, the frequency shift is greater when the star is farther. The quantum of red shift is proportional to the distance.

Of course, the movement of the star can also generate Doppler Effect as well as make a difference on the observed light's frequency. In a near region, the Doppler Effect is primary. So we can find red shift and violet shift when observing stars in the Milky Way. But in a far region, the attenuation of energy is important. So there is a popular phenomenon of red shift, and the quantum of red shift is proportional to the distance.

Frankly speaking, I don't think the universe is produced by Big Bang.

There are stars produced as well as vanished. Sometimes there are some vibrations in the universe. But the universe couldn't have been given birth rootlessly from an explosion.

## 5 Wave-Particle Duality of the Physical Particles

I was lucky enough to have acquainted myself with Professor Xiong Chengkun in an innovation convention held in Xi'an in October of 2003. Mr. Xiong gave me a photograph as shown in my figure 4. The photograph recorded the track of rising air bubbles in water. It was a beautiful wave. This indicates sufficiently that a physical particle had the nature of a wave.

I purchased the same experimental equipment after coming back home, and conducted the experiment myself. I found the effect of the experiment is very vivid and obvious.

In the following, I briefly introduce the moving characteristics of the air bubbles.

When air bubbles were emitting from the pinhole, they would have linear acceleration at first. When they reached a certain speed, they started to have wave

motion. Then their speed would become almost invariable.

When the air bubble was larger, the wavelength was shorter, and vice versa. When the air bubble was too small, its rising speed was always small, so the wave motion would not appear.

When wave motion appeared, the corresponding speed was approximately uniform, although wavelengths were different.

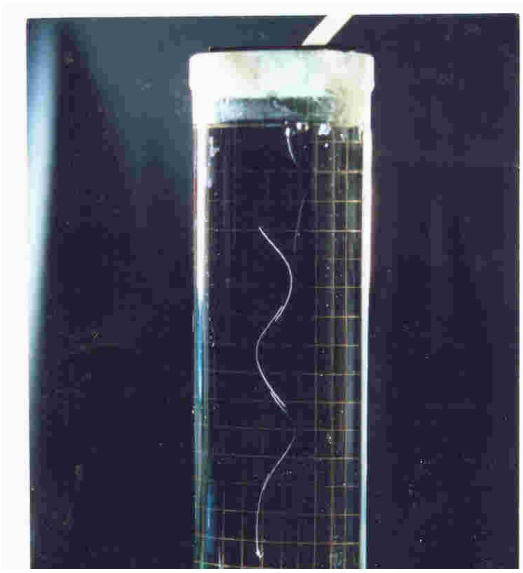

**Fig. 4 the wave-particle duality of the rising air bubble in water**

The waving track of an air bubble was not in the same plane. The air bubble was rising in a zigzag pattern. The track was an ellipse if looking down from the above.

This was a vivid and obvious example for the wave-particle duality of a physical particle.

Why a bullet or the globule traveling in the air does not have obvious waving characteristics? Why the air bubble in the water has them?

This perfectly indicates that the physical particle is acted upon by its surrounding medium in its movement.

The reason for the bullets and the globule traveling in the air without waving characteristics is that the density of air is smaller while the bullet' and the globule's mass is greater. So it's hard to embody the action from air on the bullet or globule.

The reason for the obvious waving characteristics of an air bubble is that the density of water is greater while the air bubble's mass is smaller. So the action from water on the air bubble gives birth to an obvious wave motion.

Why do the electrons and the neutrons with a high speed in the vacuum have waving characteristics?

This obviously shows that the vacuum is not empty. There must be something in it. It is the No-Shape-Substance. The action on the electron and the neutron from the

No-Shape-Substance make them wave.

So the wave motion can be divided into different types.

The first is the one like the waves we are familiar with, being transmitted along a rope or in water. The vibration is transmitted in these waves, not the medium.

The second one is a completely different type. Just like the air bubble traveling in water and the electron or the neutron with a high speed traveling in space. It is a motion of actual particles. Because of the action between these particles and the medium, their motion comes out waving.

Dear friends. The theory of No-Shape-Substance, which is built on the ground of a natural, objective and logical frame of classical physics, makes the physical laws more essential and practical. It also makes whole physical laws, experiments and phenomena become very natural, harmonious and logical.

We are living in an era when great revolutions were happening to physics. And we are shouldering a sacred mission handed down to us from history.

Wish we struggle and strive together to inaugurate a bright and nice future.

## 6 Bose-Einstein condensation

*When atoms are cooled to an extremely low temperature, they will produce unimaginable changes. The size of these atoms will increase by several thousand times and their surfaces which are originally as clear as the surface of a mirror become obscure. These atoms like ghosts penetrate through one another without any deflection. Hundreds of thousands of atoms overlap one another into a larger spherical body , which has many particular properties.*[8]

……

*Scientists make light travel through the condensation body. As a result they find that the velocity at which the light travels through the condensation body is a little more than 10 meters per second, which is similar to the speed of a bicycle.* [9]

……

That such condensation is perhaps the transitional stage through which a Shape-Substance converts into a No-Shape-Substance.

# 7 Calculating the Density of No-Shape-Substance

No-Shape-Substance is the propagation medium of light and the propagating velocity of light relative to the No-Shape-Substance is constant.

As we all know, the speed of light in other medium such as glass and water is lower than that in a vacuum. How should we explain these physical facts?

If we look at it from the viewpoint of the No-Shape-Substance, it will become quite easy for us to understand.

In the vacuum near the earth's surface, the density of the No-Shape-Substance is that of the earth's surface $S_0$. Then the velocity of light in the vacuum near the earth's surface is:

$$c = \sqrt{\frac{W}{S_0}} \tag{1}$$

In the water, the total density of No-Shape-Substance is the sum of the density of the No-Shape-Substance in the vacuum near the earth's surface and the density of the No-Shape-Substance relating to the water. That is: $S = S_0 + \bar{S}_W$

Then the speed of the light in the water is:

$$c_W = \sqrt{\frac{W}{\bar{S}_W + S_0}} \tag{2}$$

In such medium as the glass or the water, because the density of the No-Shape-Substance is larger than that in the vacuum, the speed of light is naturally lower than that in the vacuum.

In the following, the density of No-Shape-Substance in the water is calculated by some basic constants, such as refractive indices, densities of water under different temperature. Furthermore, the density of No-Shape-Substance on the earth surface is deduced elementarily.

Based on the relationship between the refractive index and velocity of light, we get:

$$\frac{c}{c_{\mathrm{W}}} = \mathrm{n}$$

Substituting c and $c_W$ with the equation (1) and (2) respectively, we can get:

$$\bar{S}_w = (n^2 - 1)\, S_0 \qquad (3)$$

From this equation, we can get the density ratios of No-Shape-Substance in the water and that in the vacuum of the earth surface under different temperature. [10, 11]

**Table1. Refractive Indices of the Water and Ice under Different Temperature**

| t/℃ | Pure Water | t/℃ | Pure Water | t/℃ | Pure Water |
|---|---|---|---|---|---|
| | （Ice）1.313 | 20 | 1.33299 | 38 | 1.33079 |
| 0 | 1.33395 | 22 | 1.33281 | 40 | 1.33051 |
| 5 | 1.33388 | 24 | 1.33262 | 42 | 1.33023 |
| 10 | 1.33369 | 26 | 1.33241 | 44 | 1.32992 |
| 12 | 1.33359 | 28 | 1.33219 | 46 | 1.32959 |
| 14 | 1.33348 | 30 | 1.33192 | 48 | 1.32927 |
| 15 | 1.33341 | 32 | 1.33164 | 50 | 1.32894 |
| 16 | 1.33333 | 34 | 1.33136 | 52 | 1.32860 |
| 18 | 1.33317 | 36 | 1.33107 | 54 | 1.32827 |

**Table2. $\bar{S}_w / S_0$ Under Different Temperature**

| t/℃ | Pure Water | t/℃ | Pure Water | t/℃ | Pure Water |
|---|---|---|---|---|---|
| | （Ice）0.723969 | 20 | 0.776862340 | 38 | 0.771002024 |
| 0 | 0.779422603 | 22 | 0.776382496 | 40 | 0.770256860 |
| 5 | 0.779235853 | 24 | 0.775876064 | 42 | 0.769511853 |
| 10 | 0.778729016 | 26 | 0.775316408 | 44 | 0.768687206 |
| 12 | 0.778462288 | 28 | 0.774730196 | 46 | 0.767809568 |
| 14 | 0.778168910 | 30 | 0.774010886 | 48 | 0.766958733 |
| 15 | 0.777982228 | 32 | 0.773265090 | 50 | 0.766081524 |
| 16 | 0.777768889 | 34 | 0.772519450 | 52 | 0.765177960 |
| 18 | 0.777342249 | 36 | 0.771747345 | 54 | 0.764301193 |

From the table 2, we know that the density of No-Shape-Substance in the water is reducing while the temperature is increasing.

It is worth noticing that the density of the water is changing while the temperature is changing. When the density $\rho$ of water is known, according to the equation $\overline{S}_W / \rho$, we can calculate out the mass of No-Shape-Substance corresponding to the water of certain mass under different temperature.

**Table3. The Mass of No-Shape-Substance Corresponding to 1kg Water or Ice [$S_0 10^{-3}$(kg)]**

| t/℃ | Pure Water | t/℃ | Pure Water | t/℃ | Pure Water |
|---|---|---|---|---|---|
| | （Ice）0.789497273 | 20 | 0.778263213 | 38 | 0.776460541 |
| 0 | 0.779547330 | 22 | 0.778117698 | 40 | 0.776296446 |
| 5 | 0.779259230 | 24 | 0.777976600 | 42 | 0.776155746 |
| 10 | 0.778962704 | 26 | 0.777820991 | 44 | 0.775957931 |
| 12 | 0.778851714 | 28 | 0.777661981 | 46 | 0.775729769 |
| 14 | 0.778760768 | 30 | 0.777395667 | 48 | 0.775544005 |
| 15 | 0.778683042 | 32 | 0.777127413 | 50 | 0.775354767 |
| 16 | 0.778594198 | 34 | 0.776893359 | 52 | 0.775162047 |
| 18 | 0.778432053 | 36 | 0.776647993 | 54 | 0.775011856 |

From the table 3, we know that the mass of No-Shape-Substance corresponding to water or ice of certain mass is changing following the change of temperature. The mass of No-Shape-Substance is stepping down, when the temperature is increasing. Especially in the converting process of ice to water, the decrement of No-Shape-Substance is larger.

We have probed into the following conclusion in the discussion of mass-energy relation in New Physics.

No-Shape-Substance is corresponding to a state of energy. It’s a state with low

energy, which is a hiding state. While Shape-Substance is corresponding to another state of energy. That is a state with high energy, which is an uncovering state.

We demonstrate the state with low energy by 0, which is corresponded with No-Shape-Substance, while 1 demonstrating the state with high energy of Shape-Substance.

When transforming No-Shape-Substance to Shape-Substance, the matter is changed from a hiding state to an uncovering one. This is a process of heat absorbing. The energy absorbed and the mass transformed satisfy mass-energy equation $E = \Delta mc^2$.

Oppositely, energy is released when Shape-Substance is changed into No-Shape-Substance. The matter is changed from an uncovering state to a hiding one. Then the energy released and the mass transformed also satisfy mass-energy equation as above.

Energy is conservational and so is mass. But the process of the transformation of matter's state is accompanied with energy absorbing or releasing.

From the table 3, we can get the following conclusion. One reason for absorbing energy in the process of increasing temperature is that there are amount of No-Shape-Substance being translated into Shape-Substance when the temperature is increased. Another reason is the increase of the kinetic energy of molecules.

But why there is much more heat of solution in the translating process of ice to water? That is because more No-Shape-Substance is translated into Shape-Substance when ice is translated into water. If we ignore the change of energy just as kinetic energy of molecules, we can calculate the density $S_0$ of No-Shape-Substance in the earth surface.

When 1kg of ice translates into 1kg of water, the mass of Shape-Substance translated from No-Shape-Substance is: $\Delta m = 0.009945943 \times 10^{-3} S_0 (kg)$

The absorbing heat in this process is: $334 \times 10^3 (J)$

According to mass-energy equation $\Delta mc^2 = E = 334 \times 10^3 J$ , we can get

$$S_0 = 3.7348 \times 10^{-7} (kg/m^3) \tag{4}$$

Now let's calculate volume module W of No-Shape-Substance.

The velocity of light in the vaccum of the earth surface is $c = \sqrt{\frac{W}{S_0}}$ , we get

$$W = S_0 c^2 = 3.3582 \times 10^{10} (N/m^2) \tag{5}$$

From experimental laws, we know that there will be more Shape-Substance translated into No-Shape-Substance when the temperature is lower.

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