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Some Significant results obtained on the research of the Superluminal phenomena and communications:

Superluminal is a natural phenomenon and the new era of the superluminal informatics will come

Zi hua Zhang*, Hua an Zhang, Su Zhang, Zhi ying Zhong

Research group on superluminal phenomena and superluminal communications, Room. 22-441, No.10, Xu tu cheng lu, Haidian district, Beijing, China.

E-mail: zhangzihua01@126.com(Zi hua Zhang); huaanzhang@yahoo.com(Hua an Zhang)

* correspondent author

Abstract

Briefly introduced some significant results obtained on the research of the superluminal phenomena and Communications: firstly proved the causation of the superluminal propagation of the light pulses or photon trap is due to the reshaping of light pulse by the Dispersion of the media, the result of WKD experiment is correct, superluminal light pulse is real and can be used to transport the information; also for the first time proved the special relativity is pseudo visual mechanics has defect and imitation. The invariance principle of light velocity and velocity must less than c are wrong; suggest to develop and complete the visual mechanics. Real visual mechanics recognize the superluminal phenomena and consider the “Black hole” maybe is a departing superluminal celestial body. Think developing the superluminal propagation of signal is a important strategic task in informatics. .

Keywords: superluminal phenomena and superluminal communications; dispersion reshape; computer simulation; visual mechanics; Special Relativity; invariance of light velocity; time compensator; Superluminal informatics;

I. Introduction.

At the begin of this century, we read the article about WKD experiment [1] in Nature were attracted and surprised by its results, the output pulse leave the Cs cell before the input pulse in unexpectedly. Although the authors said this output pulse is virtual and can't be used to transfer the information, since Sommerfeld and Brillouin have said the velocity of energy transport v_e must less than the vacuum light velocity c [2]. Because of this experiment result conflicts with the Special Relativity, so that many scientists involved in the discussion of this experiment in world, but most persons still not believe this experiment result. We as working concern with IT technique, from the point of view; Practice is the sole criterion for testing the truth, so that we very interest in this experiment result, and think if the superluminal pulse can be used to transfer information the communication systems and computer will change magically. Meanwhile, we thought that since the pulse is detectable, it can't be virtual, we have to find what matter is this superluminal pulses, what reason make the pulses propagate so fast and how to control and use them? At same time the correctness of the conclusion of the Special Relativity also can be checked **again** [3]. We certainly thought this is a very important research subject, therefore we proposed a suggestion to make a subject to study the superluminal phenomena and superluminal communication, also wrote a lots of application and very hope can get support to do this research. Although the country leader always encourage every one make scientific and technological innovation again and again. Perhaps since the conclusions of the limited velocity in the Special Relativity, unfortunately no any response for our suggestion and applications until now. So we decided to organize a "family research group" to insist do this research and support by ourself to participate the various conferences to interchange idea and discuss with colleagues working in same area. Through 18 years hard work we have gotten a series of significant results and shall introduce some of them as following share with everyone who is interesting in such problem, we also hope can get comments from you. Our work concentrates on three aspects mainly.

a, We firstly demonstrated the correctness of WKD experiment, and pointed out Sommerfeld and Brillouin's conclusion the velocity v_e of energy transport must less than c is wrong, the

superluminal pulses is real and can transfer the information [4], superluminal is a natural phenomenon; [9].

b, At the First time, from the epistemology we reveal that: what is the Special Relativity? what the special Relativity deals with? Proposed the visual mechanics is a science to study the visual law of body motion and the Relativity and astronomy belong to him. and also pointed out that there are a serious mistakes in the special Relativity [5-8]; also showed the invariance principle of light velocity and coclusions of velocity can't larger than c are wrong.

C, We suggest develop the Superluminal informatics in future and also discuss its possibility and application prospect briefly [9-13].

II. Research on the result of the WKD experiment.

Since the importance of light pulse for advanced informatics, so that we very interest in superluminal propagation of light pulse. Here we studied three problems: a, is virtual or real the light pulse?; b, what causes the superluminal prpagation of light pulse that concern with the control of pulse; c, can the superluminal pulse propagates long distance without distortion.

2.1 The superluminal propagation of Light pulses.

2.1.1 The velocity v_e of the energy transport can faster than c;

Firstly we have to clarify that if Superluminal Pulse as an information unit is real or virtual. Does the conclusion, v_e must less than c, correct? According to the definition of the energy transport velocity v_e [2], the energy flux density P is defined as the energy passing through a surface of unit area perpendicular to the direction of propagation per second[2,3],

$$P = \Omega v_e .$$

Here Ω is the density of energy transport in the medium, and $\Omega = \epsilon E^2$. The key problem still is **what is the energy density in medium through which the energy transports?** We think that should be the energy density of the electro-magnetic wave, since the internal energy of media doesn't participate in energy transport but can cause the change of the value of the electro-magnetic field due to absorption or providing a gain. For monochromatic wave

$$P = E \times H^* = \frac{E^2}{\eta} \vec{k} \quad (1)$$

η is wave impedance, we can prove [3]

$$v_e = \frac{1}{\sqrt{\epsilon\mu}} = v_p; \quad (2)$$

Here v_p is the phase velocity of the monochromatic wave. Considering the interference overlap of monochromatic wave (see section 2.2.1), for a pulse we also have $v_e = v_g$, both v_p and v_g can larger than c . Therefore in material media, the group velocity v_g can be used to describe the energy transport velocity as Sommerfeld and Brillouin said [2]. All these mean the superluminal pulse is real. This result has also been proved in experiment [1] by the fact of that the superluminal pulse is detectable.

2.1. 2 What causes the pulse superluminal propagation.

Now, let's discuss the propagation of light pulse. Suppose the waveform of light pulse is $U(r,t)$, according to the definition, we have [4]

$$U(r,t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} A(\omega) e^{i\omega(t - \frac{r}{c})} d\omega, \quad (3)$$

$A(\omega)$ is amplitude of components. When such pulse passes through a medium with constant dispersion, ignoring absorption and gain, the dispersion of the medium causes a different phase change for each component. Here we suppose the dispersion is constant. Let ω_0 is central frequency, corresponding to index n_0 , thus for an arbitrary component have $\omega = \omega_0 + \Delta\omega$, with the index $n = n_0 + \frac{dn}{d\omega} \times \Delta\omega$, the expression of pulse passing through this dispersion medium becomes :

$$U'(r,t) = \frac{1}{\sqrt{2\pi}} \int_{-\Delta\omega_1}^{\Delta\omega_1} A(\omega) \exp\left(i\omega\left(t - \frac{n_0 + (\frac{dn}{d\omega}) \times \Delta\omega}{c} r\right)\right) d\omega \quad (4).$$

Since ω_0 is a constant, so that $d\omega = d(\Delta\omega)$. For the first approximate we can get

$$\begin{aligned} U'(r,t) &= \frac{2}{\sqrt{2\pi}} \frac{\sin\left(t - \frac{r}{c}\left(n_0 + \frac{dn}{d\omega}\omega_0\right)\right)\Delta\omega_1}{t - \frac{r}{c}\left(n_0 + \frac{dn}{d\omega}\omega_0\right)} A(\omega'_0) \exp\left[i\omega_0\left(t - \frac{r}{c}n_0\right)\right] \\ &= C(r,t) \exp\left[i\omega_0\left(t - \frac{r}{c}n_0\right)\right] \end{aligned} \quad (5)$$

After reshaping by dispersion, the original pulse $U(r,t)$ becomes a new pulse $U'(r,t)$ that is represented by the enveloped function $C(r,t)$, with the peak at place $r - v_g t = 0$ and moves with a group velocity v_g :

$$v_g = c / (n_o + \frac{dn}{d\omega} \omega_0) = \left. \frac{d\omega}{dk} \right|_{k_0} \quad (6)$$

Since the dispersion can be positive or negative, so that the group velocity v_g can be less than, equal to or larger than c , even can be negative. When v_g very small or trend to 0, i.e. photon trap; $v_g > c$, i.e. superluminal propagation; $v_g < 0$, time advance of the output pulse happen. We think the pulse is only a assembly of photons in time and space. We have checked the result of WKD experiment, in this experiment dispersion $dn/d\nu \approx -0.947 \times 10^{-12} \text{sec}$, pulse frequency $\nu_0 \approx 3.5 \times 10^{14} \text{ Hz}$, the interval of the gain line $\delta\nu = 1.35 \text{ MHz}$, The curve of refractive index n obtained by us was shown in fig.1, and the first and second derivative of n Were shown in Fig.4.

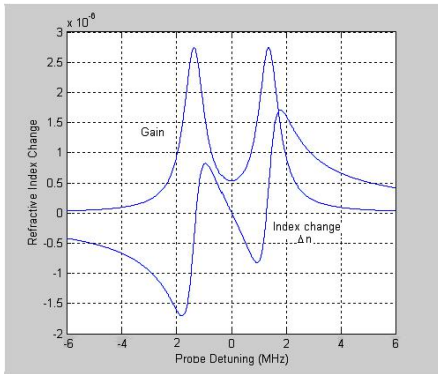


Fig.1.Simulated curve of refractive index n and Double gain lines in WKD experiment

Computer simulation.

To prove the correctness of our theoretic calculation, we study the propagation behavior of a pulse consisting of 21 cosine waves by virtue of computer simulation. The expression is as following [4]

$$Y = \sum_{i=-10}^{i=10} y(i) = \sum_{i=-10}^{i=10} \text{Cos}[\omega(i)(t - L \times (n_o + i \times \frac{dn}{d\omega} \times d\omega) / c)] \quad (7)$$

$$\omega(i) = \omega_0 + i \times d\omega \quad i = -10:10$$

Here ω_0 is central frequency, L is propagation distance, n_o is index of the wave with frequency ω_0 , $D=dn/d\omega$ is dispersion, c is light velocity in vacuum and the velocity in medium is c/n . Taking the parameters as $\omega_0 = 1$, $d\omega = 1 \times 10^{-2}$, $n_0 = 1$, $c = 1$, the calculation result does not loss the generality. The simulated results are shown in fig. 3. We can see that in dispersion medium the behavior of pulse propagation is different from that of each component(Fig.2). The

simulation results fully reveal the characters of group velocity. When dispersion changes, the group velocity also changes accordingly. When $v_g < 0$, the time advance occurs exactly. It means the negative v_g is faster than infinite exactly, since for an infinite velocity we can only get $t = 0$. When $v_g < 0$, the arriving time is negative, and the output pulse leaves the Cs cell before input pulse reaches. For example, when $L=6$, if $D= -10$, we get time $t = -54$; and $D = -20$, $t = -114$, that are agree with simulation results (fig. 3). Here we have to say the dispersion force is a kind of magical force.

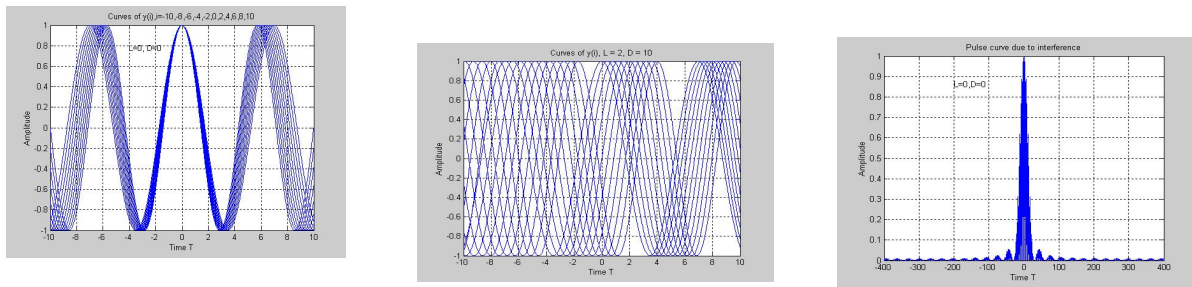


Fig. 2. 21 cosine waves and their propagat

Fig. 2.2 Light pulse compounded with 21 cosine waves

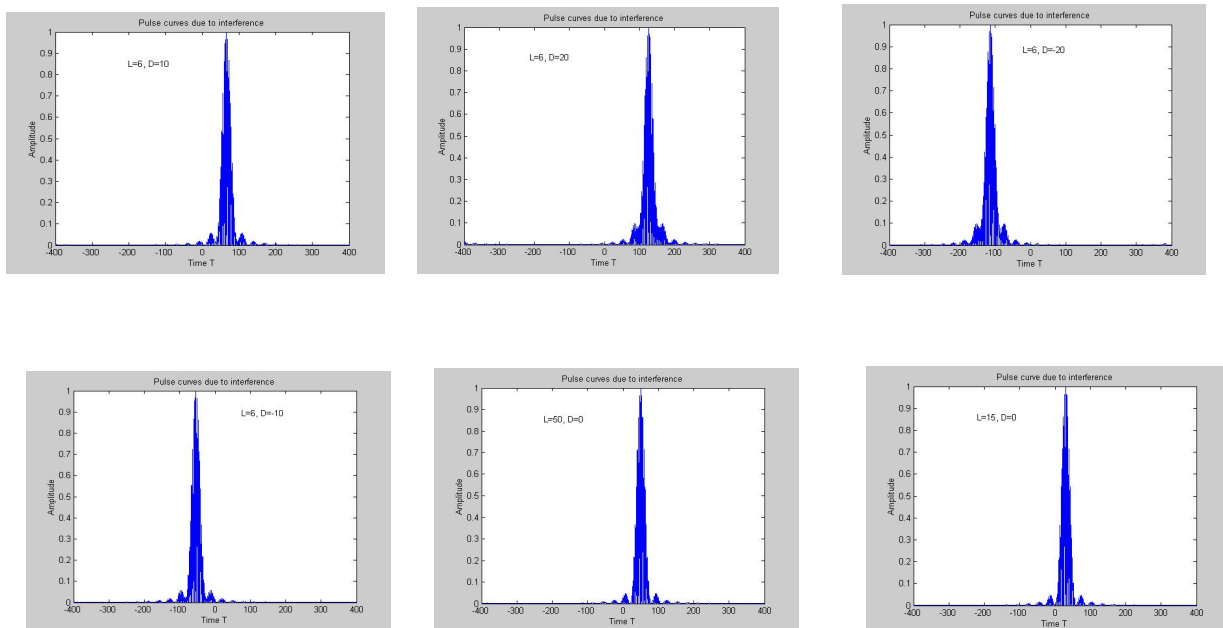


Fig.3. Propagation of light pulse in medium with different

Comments for the paper of WKD experiment.

According to our research, the result of WKD experiment is correct and has a very important meaning in Science and technology development, it announced a new era of the superluminal will appear, meanwhile it also shows the Relativity is not a universal truth, body move can faster than c , Superluminal movement is a natural phenomena. According to our theory the time that the superluminal pulse though the Cs cell should be

$$t = l/v_g \quad (8)$$

Where l is the length of the Cs cell, and v_g is speed of the pulse, according to the data provide by paper we can calculate $v_g = -c/310$, $l = 6\text{cm}$, get $t = -62\text{ ns}$, it is agree with the measured value $t = 63 \pm 1\text{ns}$, meanwhile shows that a negative velocity is faster than the infinite therefore the time advance of the output pulse happen. On the other hand, for the gain aided beams pump SRS the transit broadening should be [14]

$$\Delta\omega = \sqrt{2\ln 2} \frac{V}{W_0} \quad (9)$$

Here V is the velocity of the particle stimulated through the laser beam, and W_0 is the waist of the pumping laser beam.

2.1.3 Propagation of the superluminal pulse

We think if ignoring nonlinearity and absorption the propagation of the superluminal pulse still obey the transmission equation as following [6]

$$\frac{\partial A}{\partial z} = -\beta_1 \frac{\partial A}{\partial t} - \frac{i}{2} \beta_2 \frac{\partial^2 A}{\partial t^2} \quad (10)$$

And here

$$\beta_1 = \frac{1}{v_g} = \frac{n_g}{c} = \frac{1}{c} \left[n + \omega \frac{dn}{d\omega} \right] \quad (11)$$
$$\beta_2 = \frac{d\beta_1}{d\omega} = \frac{1}{c} \left[2 \frac{dn}{d\omega} + \omega \frac{d^2 n}{d\omega^2} \right] = \frac{\lambda^3}{2\pi c^2} \frac{d^2 n}{d\lambda^2}$$

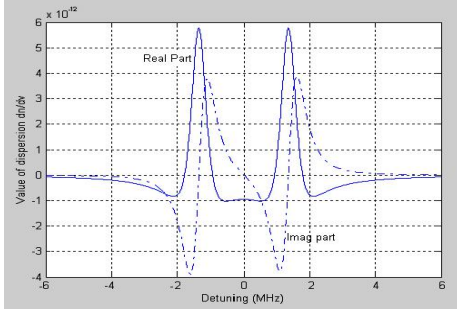


Fig. 4.1. Derivative of the index n.

.....Imaginary part, —— real

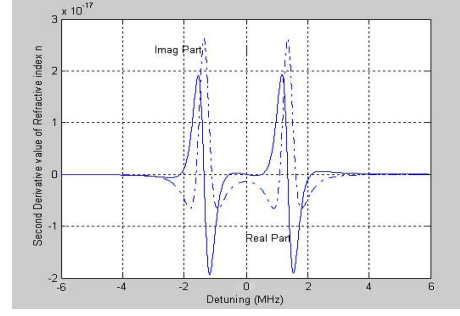


Fig.4.2. Second derivative of index n.

..... Imaginary part, —— Real part.

From fig.4 we can see that in the center region $dn/d\omega = \text{constant}$, and $d^2n/d\omega^2=0$, so that we have

$$\beta_2 = \frac{2}{c} \frac{dn}{d\omega} \quad (12)$$

The dispersion length

$$L_D = \frac{T_0^2}{|\beta_2|} = \frac{cT_0^2}{2|dn/d\xi|} \quad (13)$$

Here T_0 is the width of the pulse, in practice no need such negative dispersion as in WKD experiment, our research shows by suitable choice the parameters the superluminal pulse can travel a long distance without distortion[8].

III Research on the Special Relativity.

For realizing the superluminal informatics, firstly we have to answer this question, is the Einstein's conclusion [15]: no body (include the signal) can move faster than c , correct? Since the Relativity has been considered as the most glorious scientific achievement in 20 century and is a universal truth. Most Scientists always use it to against the superluminal phenomena. In this century except WKD experiment, In 2011, European Scientist also found the velocity of the neutrino slight larger than c [16], that was not accept by the people due to it conflicts with Einstein's conclusion for any body must has $v < c$, although this result has been observed more than ten thousand times. Meanwhile also a lots of superluminal phenomena have been found [17]. So that we very interest this question, v must less than c , is it really? For generizing the superluminal informatics we have to do some deep resarch on the Special

Relativity from three aspects,

a), Epistemology;

b), The defect of SR,

c), The special character of SR.

3.1 Epistemology

In the long terms social practice, the human being has created two kinds of method to recognize the external world: one is the **objective epistemology** that considers the external world exists objectively and is independent of our observation and all the external bodies constitute a objective (or real) world; all subjects such as classical mechanics and quantum mechanics etc that are independent of observation belong to this category. Other is **subjective epistemology** that considers we recognize the external body through the observation. Only the body that emits light (or electromagnetic radiation) received by our eye or other instrument produce a vision is recognized. Since the light or electromagnetic wave has a certain velocity c in vacuo, for a body far away the light emitted from it be received need a time Δt , where $\Delta t = L/c$. L is the distance between the body and the observer. For a motive body, the object observed only is the image A' of the body A (Fig.4), at that time the body observed has moved to a new place from its original place a distance $\Delta L = v \times \Delta t$ or $\Delta L = \int_0^{\Delta t} \vec{v} \times dt$. Here v is the body's velocity. So that the object you have seen only is the image (Δt ago) or the virtual body. The astronomy and the Relativity just belong to the subjective epistemology, such as the Sun you have seen is image of Sun about 2.5 minute ago. All the images or virtual bodies also constitute a virtual (visual) world. In such case the observer is at the center of the events and all observed result are relative. This is why we name this subject as the Relativity. So that for an observer the light velocity in different system is different too. But for any observer rest in the system the light velocity always equal to c .

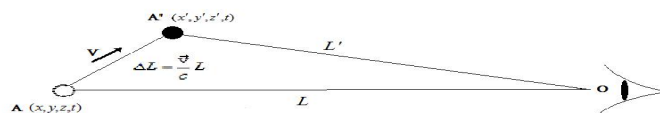


Fig5. The relationship between object and its imagine for a motive body.

3.2, The defect of the Special Relativity.

Although the Relativity has been considered as a truth by some person, and usually be used to judge the correctness of another theory or the experiment result in Physics, such for WKD experiment [1] and the velocity of the neutrino [15]. But we have found some Einstein's conclusions gotten from the Special relativity may not correct. So many confusions caused by the Lorentz transformation, here we list some important facts as following.

3.2.1. The conclusion of the rule contraction and clock retardation may not correct.

An important result of the Lorentz transformation is the contraction of the rule and the retardation of the clock in a moving system [15]. But in our opinion this conclusion isn't self-consistent and may not correct. Suppose have two systems A(x,y,z) and A'(x',y',z') with a relative moving velocity v, According to the Lorentz transformation we can get

$$x'_2 - x'_1 = (x_2 - x_1)\sqrt{1 - (v/c)^2}; \quad t'_2 - t'_1 = (t_2 - t_1)/\sqrt{1 - (v/c)^2}. \quad (14)$$

From equation (14), the observer A in system A(x,y,z) considers the rule contradict and clock retardate in system A'(x',y',z'). But from the reverse Lorentz transformation, we also can get

$$x_2 - x_1 = (x'_2 - x'_1)\sqrt{1 - (v/c)^2}; \quad t_2 - t_1 = (t'_2 - t'_1)/\sqrt{1 - (v/c)^2}. \quad (15)$$

The observer A' in system A'(x',y',z') considers the rule contradict and clock retardate in system A(x,y,z) too . Which one is correct? What is the matter? We think these contradiction and retardation may have no real meaning only are apparent phenomena. Just as two persons been even with look at each other, the farther away the opposite is the less high with, that only is a visual mistake.

3.2.2. The problem of the Addition theorem of velocity.

From the Lorentz transformation Einstein got the Following equation [15]

$$u = \frac{u' + v}{1 + \frac{u'v}{c^2}} \quad (16)$$

This is the famous addition theorem of the velocity, it is very different from the addition of the velocity in ordinary mechanics, if $u' = c$, and $v = c$, can still have $u = c$. this is the reason Einstein asserted that any velocity of body can't be larger than c. The question is that here v is the relative velocity of two system, but u and u' is the velocity in different system. According to Lorentz transformation, the units of time and length are different in two systems, and the velocities with different time and length units in different systems are different as well.

How can we put them together to plus or minus? Who can do that? Anyone with even a modicum of intelligence would suspect this action. We think perhaps the formula (16) should change its name and called as the corresponding theorem of velocity. i.e. the velocity u in system A corresponds to a velocity u' in system A' - they have different units, in different system too, are different quantity. Between them, there only has a corresponding relation and can't put them together to plus or minus.

3.2.3. The principle of light invariance is incorrect.

Einstein considered that the light velocity in vacuum c is the solution of the Maxwell equation, should be independent of the situation of the observer and the light source [15], he had a famous thought that known by us: if you follow a light beam go forward with velocity c and look at another light beam it still travels with c , that is the rudiment of the invariance of light velocity. In fact, in the medium the light velocity depends on the situation of the observer due to the dragging effect. Even if in the vacuum, the interference of two light beam also shows Einstein's thought is not correct, since if two light beams with relative velocity c , when they meet each other since the phase difference change rapidly, as a average result there should no interference pattern appear. The idea of the light velocity invariance also violates the basic principle of all observed result is relative. We think the light velocity depends on the situation of the observer certainly, and the invariance of the light velocity only means in any vacuum system the light velocity is c respect to an observer rest in the system.

We still can list more questions in SR that means some contents and conclusions of SR may incorrect. Obviously the special Relativity isn't a truth, some conclusions obtained from it also may be not valid in any case.

3.3. The special character of the Special Relativity.

In 19 century the observed results in the astronomy do not coincide with that calculated by the classical mechanics was a most important problem. For solving this problem in 1905 Einstein created the Special Relativity. To be honest at the begin of this research we still has some questions not clear, such as what is the exact meaning of the Lorentz transformation, does this transformation suit for any visual case as Einstein said? Are all conclusion obtained from it correct? Why so many phenomena or experiment results violate these conclusions [17]. Here firstly we have to know what is the Special relativity and what problem it deals with?

We have defined the visual mechanics [8] as a subject to study the motion law of the body in the virtual world i.e. the visual motion law of the body that corresponds to the Classical

mechanics studying the motion law in the real world. In general, as we know at least there are two kinds visual phenomena need to study in day life [6].

- a. One observer studies the motion law of body in different inertial systems;
- b. Two observers in different inertial systems study the motion law of same body.

For distinguish, we called the first situation as real visual mechanics; second situation as pseudo visual mechanics. For the real visual mechanics we have deduced the time-space coordinate transformation for different systems is [6]

$$\begin{aligned} x &= x' + x_0 + vt', & t &= t' - (x_0 + vt') / c' = t'(1 - v/c') - x_0 / c'; \\ x' &= x - x_0 - vt', & t' &= t - (x_0 + vt) / c = t(1 - v/c) - x_0 / c \end{aligned} \quad (17)$$

Or when $x_0=0$,

$$\begin{aligned} y' &= y, & z' &= z, & x' &= x - vt, & t' &= (1 - v/c)t; \\ y &= y', & z &= z', & x &= x' + vt', & t &= (1 - v/c')t', \end{aligned} \quad (18)$$

Since the light velocity depends on the situation of the observer, so that for an observer the light velocity in different systems is different too. In such case the time space covariance is

$$x^2 + y^2 + z^2 - (ct)^2 = x'^2 + y'^2 + z'^2 - (c't')^2 \quad (19)$$

Because of $c \neq c'$, the equation (19) no solution, but from equ.(18) can get

$$c' = c - v, \quad \text{or} \quad c = c' + v. \quad (20)$$

This result should can be proved by experiment although is againted strongly by Einstein in the Relativity. On the other hand in coordinate transformation (17), (18), no limitation need on the velocity v and time t , it means the real visual mechanics recognize the superluminal and time advance, so that can study these phenomena. Meanwhile, the real visual mechanics also can explain and predicate some phenomena in the astronomy, such as if the velocity of the celestial body is very fast, when it is in coming the Brightness will raise corresponding to the “flare” and on leaving the brightness will weaken, due to the variation of the photon number received per second with the velocity and the motion direction of the celestial body. When the celestial body is on leaving with $v > c$ the observer may can't receive the light signal from it, then form a “black hole”. Moving so fast celestial body will interact with surrounding materials which certainly will rapidly full the empty leaved by this celestial body causes a whirlpool just as a leak in river or pool, that still need be demonstrated by astronoemic observation.

In the pseudo visual mechanics situation, for each observer rest in the system in vacuum the light velocity is c certainly. We definite the interval of events in each system S and S' and have [19,20]

$$S^2 = x^2 + y^2 + z^2 - (ct)^2; \quad S'^2 = x'^2 + y'^2 + z'^2 - (ct')^2; \quad (21)$$

Let $S'^2 = S^2$, the time space covariance should be

$$x^2 + y^2 + z^2 - (ct)^2 = x'^2 + y'^2 + z'^2 - (ct')^2 \quad (22)$$

The difference between equ.(19) and (22) is that in equ. (19) there just are one observer and two systems, but in equ.(22) both the number of the observers and system are two. From equ.(22) Einstein deduced the Lorentz transformation.

$$\begin{aligned} x' &= \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}}, & y' &= y, & z' &= z, & t' &= \frac{t - \frac{v}{c^2}x}{\sqrt{1 - \frac{v^2}{c^2}}}; \\ x &= \frac{x' + vt'}{\sqrt{1 - \frac{v^2}{c^2}}}, & y &= y', & z &= z'', & t &= \frac{t' + \frac{v}{c^2}x'}{\sqrt{1 - \frac{v^2}{c^2}}}; \end{aligned} \quad (17)$$

Obviously the Special Relativity just is the pseudo visual mechanics. The Lorentz transformation, that is the core of the Special Relativity, is the coordinate transformation of two systems when two observers in different inertial system observe the motion of same body. So that, in our opinion the Special Relativity theory is valid only in a special case, the conclusions obtained from it by Einstein can't have a universal meaning. Therefore we think the Einstein's assert no body can move fast than c is incorrect, he mistakenly generalized the result of special case to the general case. Our opinion is the velocity of the electromagnetic wave is determined by the electromagnetic property of the transmission medium only, the body velocity is determined by itself motion law, and has no relation with the Special Relativity. The superluminal is a natural phenomenon, the velocity of neutrino slightly larger than c is correct certainly that also has been observed in Superstar A1987 explosion.

In general speaking, many physicists consider the Classical mechanics study the motion law of body with lower velocity and the Relativity study the motion law of the body with the faster velocity, we think this point of view isn't correct. In fact, the Relativity study only one kind of the visual motion law and is only a pseudo visual mechanics, although the satellite and

spacecraft move with about 10^4m/s velocity, but their flight path still comply with the classical mechanics no necessary the modification of the Relativity. In other words The Relativity kinematics [19] can't study the real visual motion law of the body since it only is a pseudo visual mechanics. The visual flight path of the celestial body or the spacecraft will be given by the real visual mechanics and not the Special Relativity. We also think at present most the knowledge of the Relativity may need modification, since as a pseudo visual mechanics is very different from a universal truth that is valid in any case. The opinion using $\sqrt{(v/c)^2 - 1}$ instead of $\sqrt{1 - (v/c)^2}$ in the Lorentz transformation to study superluminal phenomenon also is incorrect we think we need recognize the Special Relativity again and suggest to develop and perfect the visual mechanics that is very important to us.

IV, Superluminal informatics.

21 century is a informatic era, Since 1970s the development of Fiber communications and mobil communications, very lager variance take placed in informatics. From the developing direction of communications, in general basicly we are around to solve three tasks: 1, safe and reliable; 2, larger capacity that provide more service to users; 3, fast transmission speed of the information. Considering the generalization of Internet, and the requirement of remote control and detection in future astronomic development and the interstellar communications, as well as both in civilian and military applications, the requirement of higher capacity and faster speed of the information propagation become urgent day by day. Except the problem of safe and reliable needs be solved by virtue of pulses code and quantum technique, due to the capacity also ratio to the signal velocity so that the raise the transmission velocity of the signal becomes the key problem of the informatics in future. Base on the research on the superluminal pulse, we suggest using superluminal signal propagation to instead of traditional one that will benefit to both computer and communications. In single or super computer that is Consist of many single computers operate in parallel, except the operate unit, also has many transmission lines, if these lines made by special material in it the signal can move with a velocity $v > c$, the operate rate of the computer also can faster too. For the communications when using the superluminal transmission of the signal the channel number can decrease, thus simplifying the multiplexing and de-multiplexing process and reducing the measures of various compensations. Perhaps, one channel can have several T bits capacity. As the signal velocity goes up, the capacity of communication system or computer increases accordingly.

We have discussed the possibility of the superluminal communications [9-13]. We think the key measure is to keep the signal travel in a transparent region with higher constant negative dispersion since the frequency width of the signal is very narrow find a approximate constant negative dispersion region may not difficult. Gain-aided technique is one choice of the measures. We have calculated the variation of the index n for gain-aided technique shown as fig. 4. and discussed in section 2.1.3.

Our research shows by virtue of choicing suitable parameters the superluminal pulse can transfer a long distance without distortion[22]. Our point of view is that the superluminal communication can not only simplify the communication system, a single channel can transfer several T bits information, but also thus simplifying the multiplexing and de-multiplexing and compensation of non-linearity and dispersion, in our opinion, only after established the superluminal communication system, we can say we have construct the information highway. The superluminal propagation of light pulse in fiber has been observed [23]. In 1997, Nimtz had realized the superluminal propagation of information [24] in barrier. All of these prove the possibility of superluminal communications. Especially since the phenomena of time advance of pulse with negative group velocity ($L= v_g t$) can make a “time compensator” we call as “3z compensator” to short the time of information transmission for improving the capacity of remote control and telemetry, the superluminal communication technique also provide the possibility for interstellar communications in future. Therefore both in civilian and military applications the superluminal communication technique has a bright prospect. We think to develop the superlukminal transmission of the signal is a important strategic task.

V, Summary

We have insisted to study the superluminal phenomena and communications for more than 18 years. Here we briefly introduce part of our research results on three aspects. First, we have revealed the theoretic foundation of superluminal propagation of light pulse, and proved the result of WKD experiment is correct also pointed that in high negative dispersion region the concept of the group velocity still valid and the supereluminal pulses are real and can be used to transfer the information; Second, for solving the contradiction between the Special Relativity and the superluminal motion we have shown the Special Relativity only is a pseudo visual mechanics and not a universal truth, the conclusion gotten from the special relativity

may not fit any case especially the conclusion, no body can move faster than c , that always used by some physicists to deny the superluminal phenomenon and experiment result is incorrect, because of the ignoring the difference between two epistemologies. We also raised the question that the invariance principle of light velocity is incorrect, and pointed out that the light velocity depends the situation of the observer and superluminal motion is a natural phenomenon that was againsted by Einstein, We also think what attitude to the conclusions of some famous Scientists is a criterion to test the maturity degree of a scientist. Third, we suggest using the superluminal propagation of the information to improve the properties of the computer and communications we believe the superlumoinal informatics will appear to us in future certainly. We think our research results are very important, and wolud like share with all interest in informatics. And hope coporatete with any person or org, push to practicization of the superluminal informatics.

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