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Reanalyzing the Typical Waves to Prove the *EM* Wave Being Continuous Medium (Ether) Wave and Revealing, Re-Explaining (Refuting) Some Mistakes and Some Assertions of GRT

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Abstract Wave equations always reflect the mechanical and physical properties of a continuous medium. Perhaps we already understand the various forms and patterns of wave behavior and can utilize them. However, we have not yet conducted an in-depth analysis and synthesis of the details of the mechanism of action of waves and more features of the medium itself. This paper is comprised by two parts. The Part1 re-analyses and clarifies the common characteristics of the typical waves to re-explain *EM* waves and to prove the existence of propagation medium of *EM* wave. The gravity is by the way proved the effect of ether pressure. Related issues of Schrödinger's equation are discussed. The Part2, regarding the debate on GRT, mainly based on objective physical fact that GRT mistakes the reaction force of gravity for gravity itself when GRT deducing the claim of space-time warping and based on the analysis results of the Part1 that universal gravity acts directly on the basic (elementary) particles of matter, the Part2 refutes GRT's assertion of space-time warping. Since many evidences and verifications for the existence of ether have been provided in Part1 of this article and by many precedence researchers, Part2 hence also set a major premise of a hypothesis of the existence of ether, to re-explain (refute) some GRT assertions. This approach conform the hypothetical judgment logical reasoning method. Conclusions can be tenable. Due to limited conditions, no more related experiments can be carried to prove the conclusions by author in short time.

Keywords Wave, *EM* wave, Ether, Gravitational force, Planck constant, GRT, Warping of spacetime

1. Re-analyzing and Re-clarifying Characteristics of Typical Waves to Prove the Existence of Ether

A traveling wave that causes the particles of the disturbed medium to move perpendicular to the wave motion is called a transverse wave.

A traveling wave that causes the particles of the medium to move parallel to the direction of wave motion is called a longitudinal wave.

However, actually, there is no absolute longitudinal wave and no absolute transverse wave. Any wave possesses both longitudinal component and transverse component.

Most waves are combination of both components. It is only the problem of having more of one thing and less of another.

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1.1. Analysis of Typical Waves

1.1.1. Analysis of Sound Wave

Sound waves are the most important example of longitudinal waves. As the waves travel, the particles in the medium vibrate to produce changes in density and pressure along the direction of motion of the wave. These changes result in a series of high-pressure and low-pressure regions.

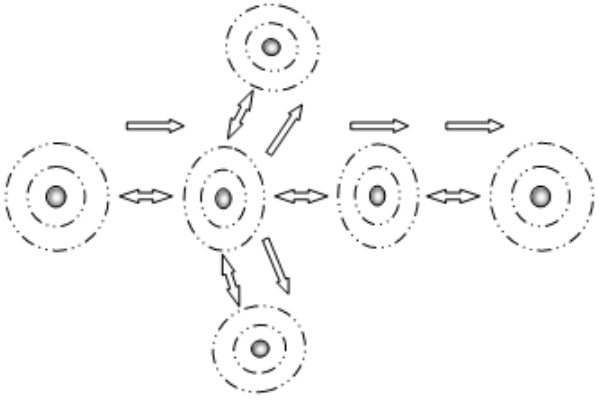

Figure 1.1.1

Since gases are homogeneous elastic medium, contraction and expansion is not only occurs in longitudinal and transverse directions, but also occur in all direction. The oscillating components and energies in all directions jointly constitute the entire waveform and the total energy of the wave, as shown in **Fig.1.1.1**.

Considering the motion of a segment of the medium (as shown in **Fig.1.1.2**), whose position is between x_1 and x_2, taking very small distance. So the segment is $\Delta x = (x_2 - x_1)$ and, using the linear density μ, its mass is $m = \rho V = \rho A (x_2 - x_1)$.

At any time t, X is the average displacement of the segment in x direction (where $X_1 < X < X_2$).

At time t, the equilibrium position x_1 is moved to $x_1 + X_1$ and the equilibrium position x_2 is moved to $x_2 + X_2$.

The new volume of our element of air is $V + \delta V = A(x_2 + X_2 - x_1 - X_1)$ and, using (1), we have $\delta V = A(X_2 - X_1)$.

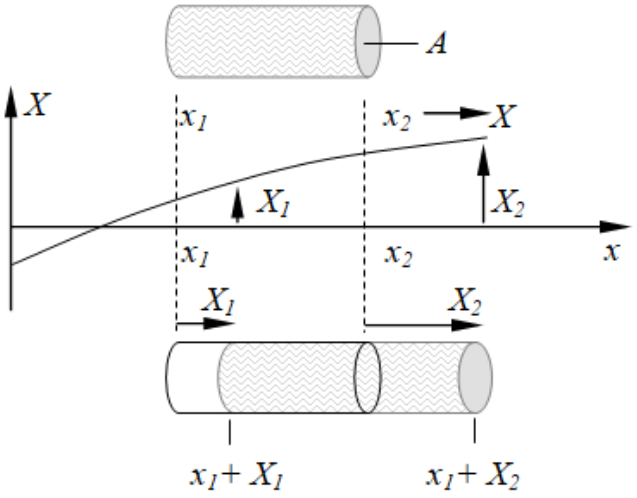

Figure 1.1.2

When a medium is compressed, its pressure rises. The ratio between the pressure increase ***p*** and the proportional volume reduction is called the Bulk modulus of elasticity ***B***, defined by

$$p = -B\frac{\delta V}{V}$$

So the pressure in the segment is

$$p = -B\frac{\delta V}{V} = -B\frac{A(X_2 - X_1)}{A(x_2 - x_1)}$$

where $x_2 - x_1$ is very small, this gives us the relation between displacement y and pressure p:

$$p = -B\frac{\partial X}{\partial x}$$

Taking the second derivative of X with respect to time, its acceleration to the right is

$$a = \frac{\partial^2 X}{\partial t^2}$$

Applying Newton's law $F = ma$ becomes

$$(F_1 - F_2) = \rho(x_2 - x_1)\frac{\partial^2 X}{\partial t^2}$$

Rearrange the equation gives

$$\frac{(p_1 - p_2)}{(x_1 - x_2)} = -\rho\frac{\partial^2 X}{\partial t^2}$$

When $x_2 - x_1$ approach to 0 obtains

$$\frac{\partial p}{\partial x} = -\rho\frac{\partial^2 X}{\partial t^2}$$

combining $p = -B\frac{\partial X}{\partial x}$ with the equation above we have

$$B\frac{\partial^2 X}{\partial x^2} = -\rho\frac{\partial^2 X}{\partial t^2} \quad \text{or} \quad \frac{\partial^2 X}{\partial x^2} = -\frac{\rho}{B}\frac{\partial^2 X}{\partial t^2}$$

— **Integration of total energy of one cycle of a sound wave is,**

$$K_\lambda = \frac{1}{4}\rho A(\omega s_{max})^2\lambda = \frac{1}{4}\rho A v(2\pi s_{max})^2 f$$

$$\boldsymbol{h_{Sound}} = \frac{1}{4}A\sqrt{\rho B}(2\pi s_{max})^2 \text{ is a constant}$$

— **Velocity of sound wave in gas is,** $V = \sqrt{\frac{P}{\rho}} = V_{0\ degreeC}\sqrt{1 + \frac{T}{273}} = \sqrt{\frac{B}{\rho}}$

— **The Bulk modulus *B* is pressure of gas, i.e. the thermal repulsive force** [1], therefore the velocity of sound V depends on the temperature T of the medium.

1.1.2. Analysis of String (Rope) Wave

In fact, an element (segment) of the string is not only oscillating in transverse direction but also oscillating in longitudinal direction (from A through B-C-D, back to A) shown as **Fig.1.1.2.1**.

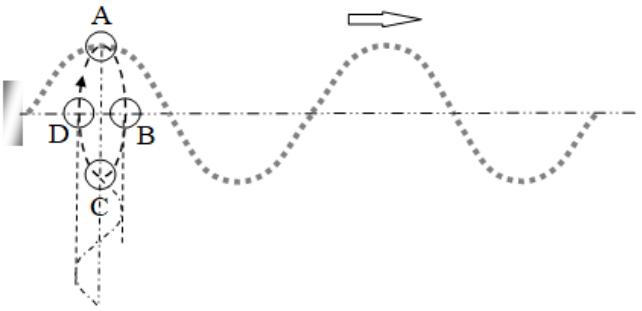

Figure 1.1.2.1

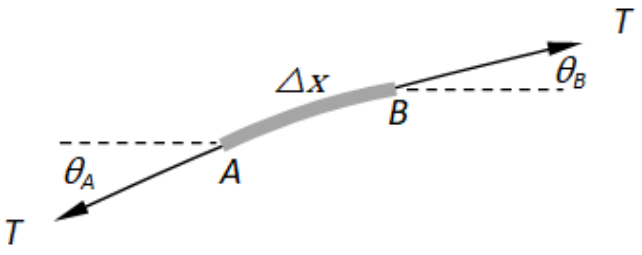

Figure 1.1.2.2

Suppose a traveling wave is propagating along a string that is under a tension *T*. **Fig.1.1.2.2** shows a segment of the string of length $\triangle x$, the slopes at points *A* and *B* are given by tan θ_A and tan θ_B, respectively.

The ends of the segment make small angles θ_A and θ_B with the *x* axis. The net force acting on the segment in the vertical direction is

$$\sum F_y \approx T(tan\theta_B - tan\theta_A)$$

The tangents of the angles at *A* and *B* are the slopes of the string segment at these points given by $\frac{\partial y}{\partial x}$, we have

$$\sum F_y \approx T\left[\left(\frac{\partial y}{\partial x}\right)_B - \left(\frac{\partial y}{\partial x}\right)_A\right]$$

Applying Newton's second law to the segment, the mass of $\triangle x$ is given by $m = \mu \triangle x$:

$$\sum F_y = ma_y = \mu\Delta x \left(\frac{\partial^2 y}{\partial t^2}\right)$$

Combining Equation $\sum F_y \approx T\left[\left(\frac{\partial y}{\partial x}\right)_B - \left(\frac{\partial y}{\partial x}\right)_A\right]$ with Equation $\sum F_y = ma_y = \mu\Delta x \left(\frac{\partial^2 y}{\partial t^2}\right)$, obtains

$$\frac{\mu}{T}\frac{\partial^2 y}{\partial t^2} = \frac{\left(\frac{\partial y}{\partial x}\right)_B - \left(\frac{\partial y}{\partial x}\right)_A}{\Delta x}$$

When the $\triangle x$ approach to 0, and B approach to A, obtains

$$\frac{\mu}{T}\frac{\partial^2 y}{\partial t^2} = \frac{\partial^2 y}{\partial x^2} \quad \text{or} \quad \frac{\partial^2 y}{\partial x^2} = \frac{T}{\mu}\frac{\partial^2 y}{\partial t^2}$$

— **Integration of total energy of one cycle of a string wave is [3],**

$$E_\lambda = \frac{1}{2}\mu\omega^2 A^2\lambda = \frac{1}{2}\mu v(2\pi)^2 A^2 f\,, \quad \text{then}$$

$$\boldsymbol{h_{string}} = \frac{1}{2}\sqrt{\mu T}(2\pi)^2 A^2 \text{ is a constant.}$$

— Velocity of string wave is $v = \sqrt{\frac{T}{\mu}}$, where *T* is tensor of string.

1.1.3. Concluding the General Notations

Any wave must have restoring force or force caused by elasticity coefficient. For the above analyzed waves, the elastic force caused by elastic constant K_a , tensor of string *T* and bulk modulus *B* makes the conversion of kinetic energy and potential energy constantly to sustain the continues propagation of the waves.

1) If there is no continuous elastic medium, there will be no wave.
2) If there is no elastic tensor, or no bulk modulus of medium, there will be no restoring force, then, there will be completely no wave at all.
3) Continue medium with homogenously or linearly distributed density and elasticity is the fundamental basic of all waves.
4) Generally, wave equation $\frac{\partial^2 X}{\partial t^2} = \frac{K}{\mu}\frac{\partial^2 X}{\partial x^2}$ is Newton's second law $\boldsymbol{F = ma}$ applying in the wave propagation or wave motion in elastic continuous medium, in other words, any wave movement equations obeys Newton's second law: $\boldsymbol{F = ma}$.
5) The first partial derivative of amplitude *X* with respect to *x*: $\frac{\partial X}{\partial x}$ is to find the elastic force caused by relative displacement acting at local position point:
$$\boldsymbol{F = -K\frac{\partial X}{\partial x}}$$
6) The second partial derivative of amplitude *X* with respect to *x*: $\frac{\partial^2 X}{\partial x^2}$ is to calculate the sum of forces exerted on the unit mass $\boldsymbol{\mu\Delta x}$.
7) The second partial derivative of amplitude *X* with respect to time *t*: $\frac{\partial^2 X}{\partial t^2}$ is the acceleration of the infinitesimal segment of mass $\boldsymbol{\mu\Delta x}$ of the medium.

1.2. Similarity of *EM* Wave Comparing with Other Waves

1.2.1. *EM* Wave is Longitudinal Wave Also

EM wave is said being transverse waves, phenomena shows *EM* wave is longitudinal wave also. Assume the elastic modulus of photon or medium is homogeneous: the mechanical volumes of medium is compressing and expanding. Contraction and expansion is not only occurs in transverse but also in longitudinal directions, and propagating in all direction. The oscillating components and energies in all directions jointly constitute the entire spatial waveform. As shown in **Fig.1.2.1**.

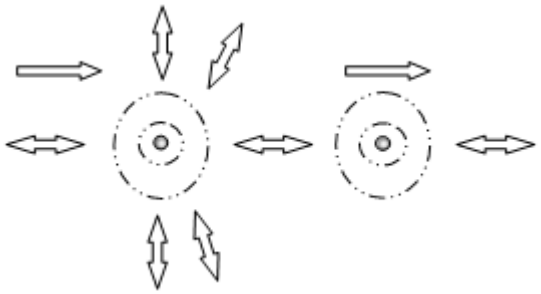

Figure 1.2.1

1.2.2. Phenomenon of the Wave Function Collapse and Uncertainty Principle II Verify *EM* Wave Propagation of Transverse Direction

Suppose we measure an *EM* wave, we must use electrons, however, ***EM*** wave is generated by electrons, when a measuring apparatus is put aside near the wave, even the power supply of the apparatus is not yet switched on (The electrons are not need power supply, the amplifier need power supply), the sensing electrons of the measuring apparatus will absorb partial energy of the measured wave at any direction, therefore destructs the construction of the wave then cause the wave function collapse. As shown in **Fig.1.2.2.**

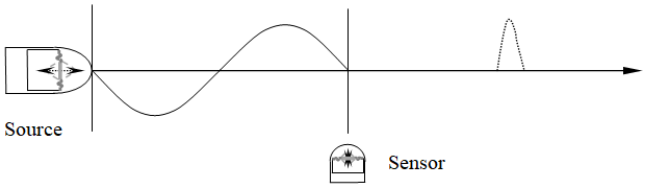

Figure 1.2.2

1.2.3. *EM* Wave is Also a Mechanical Wave

According to the conclusions of **1.1.3:**

- If there are no elastic, no elastic of medium no bulk modulus (tension or elastic force), no restoring force, there will be completely no wave at all.
- Any wave whose wave equation in the form of $\frac{\partial^2 X}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 X}{\partial t^2}$ obeys Newton's second law, and is the law applying in a elasticity and density linearly or homogenously distributed continuous medium. *EM* wave equation form is $\frac{\partial^2 E}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2}$ or $\frac{\partial^2 B}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 B}{\partial t^2}$, **verified *EM* wave** must be mechanical wave also, and *EM* wave is exactly the same as other waves that it must have its medium (ether).
- **Integration of total energy of one cycle of *EM* wave is,**
  $E_\lambda = 2\pi^2\varepsilon_0 c{A_0}^2 f$ or $E_\lambda = 2\pi^2\varepsilon_0 c{A_0}^2 \nu$ then $\boldsymbol{h_E} = 2\pi^2\varepsilon_0 c{A_0}^2$ is a constant and $\boldsymbol{h_E}$ is the ***Planck* constant** *h*.
- **The total energy over one wavelength of any waves is a constant by frequency, for *EM* wave,**

$$E_\lambda = 2\pi^2 c\varepsilon_0 A_0^2 f = h\nu\,, \quad h = 2\pi^2 c\varepsilon_0 A_0^2 = 2\pi^2\sqrt{\frac{\varepsilon_0}{\mu_0}}{A_0}^2$$

Then we can conclude that any wave has ***Planck constant*** in broad meaning, quanta energy *hν* of *EM* wave is only a particular example.

As we know, speed of *EM* and light wave $\boldsymbol{c = \frac{1}{\sqrt{\varepsilon_0\mu_0}}}$, but, how can vacuum possesses permeability $\boldsymbol{\mu_0}$ and permittivity $\boldsymbol{\varepsilon_0}$? It must be continuous medium to possess the physics properties!

Light speed *c* is wave propagating speed, not particle's displacement $\boldsymbol{\Delta x}$ divided by the time interval $\boldsymbol{\Delta t}$!

So the electromagnetic (*EM*) waves are no exception but are waves of an elastic medium (ether), with bulk modulus and restoring force to sustain the periodical conversion of kinetic energy and potential energy, and sustain the propagation of *EM* wave!

1.2.4. *EM* Wave Equation must have Mechanical Wave Property

Regarding the ***EM*** wave equation has same form of general mechanical wave that obeys Newton's second law,

$$\frac{\partial^2 E}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2} \quad \text{or} \quad \frac{\partial^2 B}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 B}{\partial t^2}$$

That means the *EM* wave equation also obeys Newton's second law $\boldsymbol{F = ma}$ and there must being homogeneously distributed *EM* inertial mass $\boldsymbol{m_{EM}}$ and homogeneously distributed *EM* elasticity or *EM* bulk modulus $\boldsymbol{B_{EM}}$? Then $\boldsymbol{F_{EM} = m_{EM}\,a_{EM}}$?

If we use $\boldsymbol{B_e}$ denotes bulk modulus of ether, $\boldsymbol{\rho}$ denotes density of ether, *X* denotes universal amplitude of mechanical component of *EM* wave, we can derive *EM* wave equation in the form of a mechanical wave

$$\frac{\partial^2 X}{\partial x^2} = \frac{\rho}{B_e}\frac{\partial^2 X}{\partial t^2} = \frac{1}{c^2}\frac{\partial^2 X}{\partial t^2}$$

Since the *EM* waves are generated by acceleration de-acceleration motions of electron with certain mass, based on the range of frequency and speed of *EM* wave and other data, we may determent the density and bulk modulus (pressure) of ether medium likely.

Therefore we can infer that the component of ***EM*** wave that manifests *EM* characteristic can be and only can be perceived by electron, while the component of ***EM*** wave that manifests mechanical wave characteristic can be measured by a reflector (such as mirror) is only a average value of pressure. No tools can measure mechanical waveform characteristic of *EM* wave currently.

1.2.5. Moment and Radiation Pressure verify *EM* Wave is also Mechanical Wave

Electromagnetic waves transport linear momentum as well as energy. If the surface absorbs all the incident energy *U* in this time, the total momentum *p* transported to the surface has a magnitude: *p* =*U*/*c*.

The pressure exerted on the surface is defined as force per unit area *F*/*A*, combine this with **Newton's second law** $P = \frac{F}{A} = \frac{1}{A}\frac{dp}{dt}$. The momentum transported to the surface by light, Obtains $P = \frac{1}{A}\frac{dp}{dt} = \frac{1}{A}\frac{d}{dt}\left(\frac{U}{c}\right) = \frac{1}{cA}\left(\frac{dU}{dt}\right)$.

(*dU*/*dt*) /*A* is the rate energy arriving at the surface per unit area, which is the magnitude of the Poynting vector. Thus, the radiation pressure *P* exerted on the perfectly absorbing surface is $P = \frac{S}{c}$. If the surface is a perfect reflector and incidence is normal, the momentum transported to the surface in a time *t* is twice *p* =*U*/*c*, therefore $P = \frac{2U}{c}$.

Finally, the radiation pressure exerted on a perfectly reflecting surface for normal incidence of the wave is $P = \frac{2S}{c}$.

Based on the phenomenon above described, we can conclude that the *EM* wave conforms classical mechanics (and both equation form and deduction of pressure obeys Newton's second law), verifies the *EM* wave must be also a mechanical wave and also a longitudinal wave.

1.3. Ether must be Existence and is the Medium of *EM* Wave

1.3.1. What "*EM* Waves have no Medium is Required" and "Medium is the Light Itself" Implies? (What is Different if no Ether?)

If light or *EM* wave "medium is wave itself" (no ether or no medium), then the changes of amplitude of wave is following up and synchronized with the wave propagation speed *c*. As illustrated in **Fig.1.3.1**.

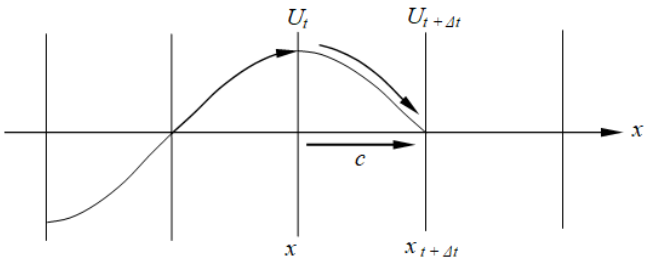

Figure 1.3.1

Thus the amplitude should be respect to *x*, the expression will be $S = S_{max}\cos(kx)$.

However, practically and theoretically, the light wave and *EM* wave function expressions are

$E = E_{max}\cos(kx - \omega t)$ or $B = B_{max}\cos(kx - \omega t)$.

The different expressions exactly prove that the light wave and *EM* wave are propagating by medium (ether) or are wave of medium (ether).

1.3.2. The Experiment of Michelson and Morley Cannot Rule Out Ether, Instead, It can only Rule Out Ether Wind, or Rule out of Ether Velocity Respect to Earth

The Experiment of Michelson and Morley that is said ruled out ether was based on a subjective hypothesis that ether has a velocity *v* respect to earth.

In fact, actually, the *MM* experiment can and only can falsifies the subjective assumption of ether wind without extra deductive conclusion.

The claims that the experiment of Michelson and Morley ruled out ether is a typical straw-man illogical fallacy [4]. !

There are two separate hypotheses before doing the *MM* experiment, ether and wind of ether. Ether can exist but ether wind of a speed *v* respect to earth may not or should not exist. !

If we assume no ether wind $\boldsymbol{v}$ (= 0), then the item in their deductions that involving $\boldsymbol{v}$ will be zero, i.e. if $\boldsymbol{v} = 0$, then

$$\Delta t = \frac{2L}{c} \times \left[1 + \frac{v^2}{c^2}\right] - \frac{2L}{c}\left[1 + \frac{v^2}{2c^2}\right] = 0$$

Therefore the result and conclusion of MM experiment cannot rule out ether.

The claim based on the result that falsifies the straw-man of ether-wind is not equal to falsify ether itself. !

MM experiment trap oneself in one's own subjective assumption that troubles oneself unnecessarily, therefore, *MM* experiment is nonsense!

1.3.3. Modulation and Electronic Warfare of *EM* Wave are Applications of Superposition and Interference Principle of Mechanical Wave, Directly Verifies *EM* Wave is Propagated by Medium (Ether)

If two or more traveling waves are moving through a medium, the resultant wave function at any point is the algebraic sum of the wave functions of the individual waves, as shown in **Fig.1.3.3.a, b, c**.

The wave function for the pulse moving to the right is y_1, and the wave function for the pulse moving to the left is y_2. The two pulses finally separate and continue moving in their original directions. The combination of separate waves in the same region of space to produce a resultant wave is called interference.

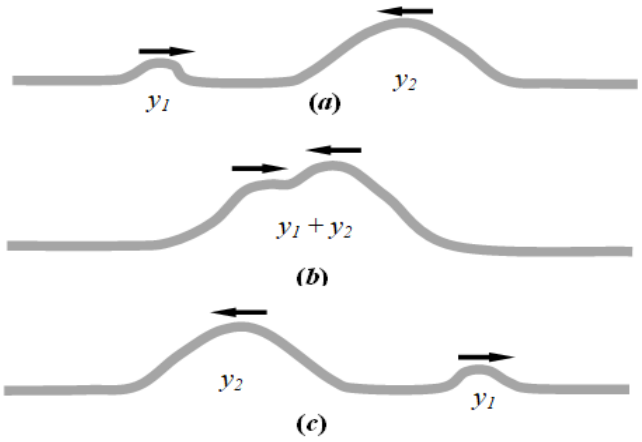

Figure 1.3.3

In *EM* wave application, modulation and electronic warfare are applications of superposition and interference technology.

Modulation is constructive interference, while electronic warfare is destructive interference. Amplitude Modulation commonly abbreviated as AM, is a common method of broadcasting radio signals. In AM, the amplitude of the carrier wave is modified in order to transmit the input signal (the one that carries information). As shown in **Fig.1.3.3d**.

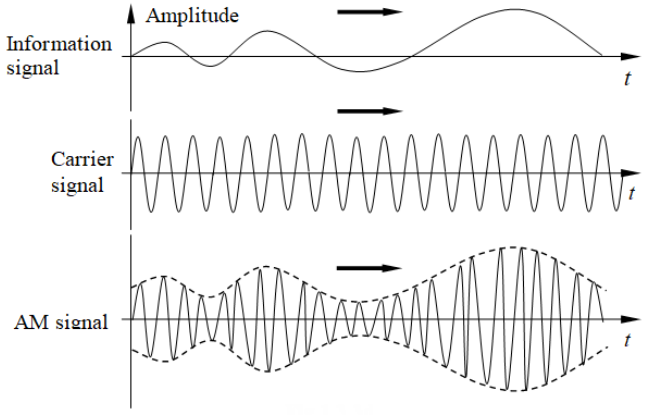

Figure 1.3.3d

Superposition and interference cannot occur on between particles, they occur only onto continuous medium wave. So *EM* wave and light wave are continuous medium (ether) waves, Particles cannot be Modulated each other!

1.3.4. The Force for Electrons to Generate and Perceive *EM* Wave are Contact Force of Ether

EM and light wave equation are exactly same as other

mechanical waves $\frac{\partial^2\psi}{\partial x^2}=\frac{1}{c^2}\frac{\partial^2\psi}{\partial t^2}$, therefore $\boldsymbol{c}$ should be determined by medium properties (of ether),

$$c=\sqrt{\frac{Bulk_{ether}}{\rho}}=\sqrt{\frac{P_{ether}}{\rho}}$$

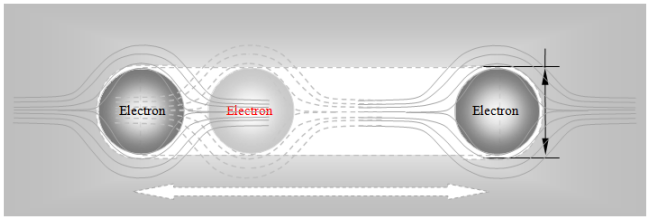

Figure 1.3.4

For electrons as matter to move forward/back push or drag the medium to generate *EM* wave and vice versa receiving *EM* wave, the force (pressure) being reacting on electrons must be contact force, thus generate pressure *P* of *EM* wave, shown as **Fig.1.3.4.**

1.3.5. Summary of the Evidences of Existence of Medium (Ether)

(Gravitational force is effect of pressure of ether, not space time warping)

1. If light or *EM* wave "medium is wave itself" (no ether or no medium), then the changes of amplitude of wave is following up and synchronized with the wave propagation speed *c*.

The oscillator of the wave as oscillating as moving, thus at any particular static position x_t, there shouldn't be amplitude changes perceived! The amplitude is only respect to *x*, the expression will be $S=S_{max}\cos(kx)$. *EM* wave function expressions are

$$E=E_{max}\cos(kx-\omega t) \quad \text{or} \quad B=B_{max}\cos(kx-\omega t).$$

The different expressions exactly prove that the light wave and *EM* wave are propagating by medium (ether) or are wave of medium (ether).

2. Amplitude Modulation verifies the *EM* wave is medium (ether) wave.
3. Any waves have Planck constant in broad meaning, quanta energy *hv* of *EM* wave is only one of typical example. Therefore, *EM* wave must be medium (ether) wave as other waves.
4. The momentum transferred to the surface by the incoming light or ***EM*** wave is $\boldsymbol{p=U/c}$, and that transferred by the reflected light also is $p = U/c$. Therefore, $\boldsymbol{p=\frac{2U}{c}}$**, means *EM* wave is propagating by medium(ether) with pressure and bulk modulus.**
5. Modulation of ***EM*** wave verifies ***EM*** wave is continuous medium wave.

1.4. Discussion of the problems Related to the Schrodinger Equation, $\hbar$ and ψ

1.4.1. Brief the derivation of the Schrodinger equation

Assume the potential is a function of *x* only, then

$$E=K+V=\frac{1}{2}mv^2+V(x)=\frac{p^2}{2m}+V(x) \qquad (1)$$

According to de Broglie's claim that $E=\hbar\omega$ and $p=\hbar k$,

$$\hbar\omega=\frac{p^2}{2m}+V(x)=\frac{\hbar^2k^2}{2m}+V(x) \qquad (2)$$

A wave with ω and k can be written as $\psi(x,t)=Ae^{i(kx-\omega!t)}$, then

$$\frac{\partial\psi}{\partial t}=-i\omega\psi \quad \text{or} \quad \omega\psi=i\frac{\partial\psi}{\partial t} \ , \quad \frac{\partial^2\psi}{\partial x^2}=-k^2\psi$$

$$\text{or} \quad k^2\psi=-\frac{\partial^2\psi}{\partial x^2} \qquad (3)$$

Multiplying the energy equation by ψ, obtains the time-dependent Schrodinger equation

$$\hbar(\omega\psi)=\frac{\hbar^2}{2m}(k^2\psi)+V(x)\psi \quad \text{or}$$

$$\mathrm{i}\hbar\omega\frac{\partial\psi}{\partial t}=\frac{-\hbar^2}{2m}\frac{\partial^2\psi}{\partial x^2}+V(x)\psi \qquad (4)$$

Putting back the *x* and *t* arguments, the equation takes the form,

$$\mathrm{i}\hbar\omega\frac{\partial\psi(x,t)}{\partial t}=\frac{-\hbar^2}{2m}\frac{\partial^2\psi(x,t)}{\partial x^2}+V(x)\psi\,(x,t) \qquad (5)$$

1.4.2. The problems of Schrodinger Equation

1) The major premise of de Broglie's claim $E=\hbar\omega$ and $p=\hbar k$ actually defines the particle being moving with a constant velocity *v*, and $\frac{\hbar^2k^2}{2m}$ are constant. In the *Eq*(1), the potential energy *V(x)* is not a constant which could cause the system in wave motion. When the particle moves in wave motion, the potential energy and kinetic energy must be transformed each other, thus the velocity *v* must not be a constant, forcing a constant equal to a variable: *V(x)* , in *Eq* (2), the *V(x)* is function of *x*, then *V(x)* is not a constant, thus the total energy is not conservative. This is self contradiction and ridiculous. Therefore it is conflicting to the Broglie's claim that $E=\hbar\omega$ and $p=\hbar k$.
2) In the *Eq* (4), multiplying by the energy equation ψ, seems a kind of modulation of energy *E* and ψ. The reason to multiply Eq (1) the energy equation by the wave equation ψ is unknown, the result is neither conform to classical mechanics nor conform to a wave equation. And for longitudinal wave and transverse wave, the result of modulation is quite different.
3) Since the Schrodinger equation uses a point mass *m* to represent the mass of the object, it seems to be derived as a formula to depict and tackle the motion of a single electron particularly. However, a single electron cannot form a wave.
4) The Schrodinger equation never indicates where the potential energy or the restoring force of the wave $\boldsymbol{\psi}$ arises from and what the potential energy *V(x)* is and

where and when it arises from.

1.4.3. Reasonable Suggestion

1) It is reasonable to derive different forms of Schrödinger equations separately in order to tackle and depict photon and electron based on their different characteristics and different circumstances. Better recognize that photon is quanta energy of integral in a wavelength of *EM* wave of the homogeneous distributed density of ether or it is the energy integral over one period of *EM* wave that is absorbed by a single electron.
2) It is better to predetermine and clarify the properties of the physics circumstance the electron involved in its action, e.g. what the restoring force and the potential energy are or where they come from at the moment. They are *EM* wave, electric field, magnetic field, thermal repulsive force, or combination of them? And then tackle it case by case separately differently.

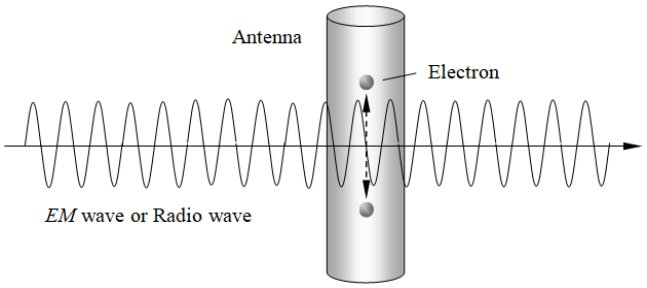

Figure 1.4.3.1

For example, an electron in a radio antenna, when *EM* wave is presents, the electron will oscillate up and down just follow the frequency of the *EM* wave. As shown in **Fig.1.4.3.1**.

The energy of *EM* wave that being absorbed by electron partially push the electron to oscillate, partially transform into potential energy.

When an electron is moving in translational motion at speed ***v*** and enter into an *EM* wave field, the motion will be the addition of **vector** of the wave and **vector** of straight line motion. As shown in **Fig.1.4.3.2**.

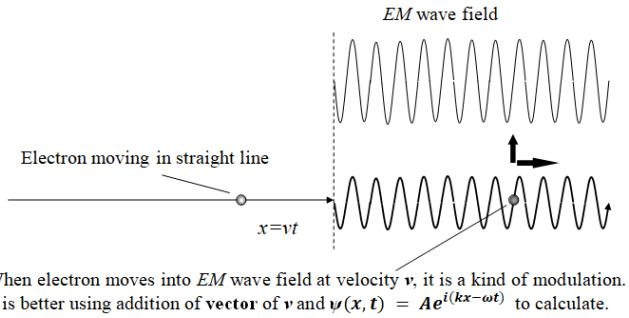

Figure 1.4.3.2

The energy of linear motion *v* of electron is transformed into potential energy of an energy level. In this case, it could be better to find the solution to the equations set (Eq. 1.4.3.2) rather than directly using Schrodinger equation.

$$\begin{cases} \dfrac{\partial^2\psi(x,t)}{\partial x^2} = -k^2\psi\,(x,t) \quad \text{or} \quad \dfrac{\partial^2 E}{\partial x^2} = \dfrac{1}{c^2}\dfrac{\partial^2 E}{\partial t^2} \\ x = vt \\ F_y = m_e\dfrac{\partial^2 y}{\partial t^2} \quad \text{and} \quad F_y = Eq_e \\ y = \int v_y(t)dt \end{cases} \tag{1.4.3.2}$$

3) Do not deny the existence of ether medium. Recognize that electrons are moving within the ether medium forever. Moreover, the wave-like properties of electrons are decided by ether and electromagnetic waves (which are actually ether waves).

2. Re-Explanations and Refutation of Some Assertions of GRT Based on Physical Reality and Result of Analysis

2.1. Brief the Postulates of GRT

2.1.1. The First Postulate of GRT Suggests Gravity Being a Warping of Space Time

General relativity depicts gravity as a warping of space time due to the presence of a body of matter, an object nearby experiences an attractive force as a result of this distortion, much as a marble rolls toward the bottom of a depression in a rubber sheet. (**Fig.2.1**)

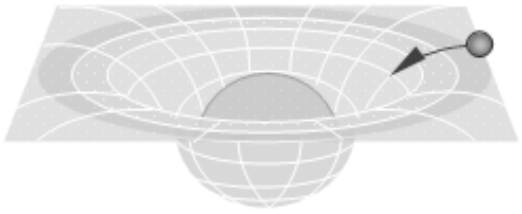

Figure 2.1

2.1.1b Problems of the First Postulate

Space-time can be similar to rubber? Why there must be no medium (ether) can also similar to rubber, just because the medium is titled as ether?

2.1.2. The Second Postulate of GRT Suggests Principle of Equivalence

According to the principle of equivalence, events that take place in an accelerated laboratory cannot be distinguished from those which take place in a gravitational field. Hence the deflection of a light beam relative to an observer in an accelerated laboratory means that light must be similarly deflected in a gravitational field.

A repulsive force in the Einstein theory, the repulsive force occurs at some distances from the quasi-spherical system which depend on time lapsed from the beginning of the change of the mass. $R_{\mu\nu} - \frac{1}{2} g_{\mu\nu} R + \Lambda g_{\mu\nu} = kT_{\mu\nu}$, where $T_{\mu\nu}$ is the energy-momentum tensor, $g_{\mu\nu}$ is the metric tensor, $R_{\mu\nu}$ is the Ricci curvature tensor, R is the scalar curvature and Λ is the cosmological constant.

2.1.2b Problems of the second postulate

How GRT to explain Coulomb forces, magnetic field forces and centrifugal or orbital force? Those forces also cause acceleration. How can "space-time" have elasticity or tension or something like bulk modulus result in the so called "warping"?

If ether and thermal repulsive force are recognized, the conjectures of warping (and) of "space-time" can be dropped.

2.2. Discussion of LIGO Experiment and Cavendish's Gravitational Torsion Balance Experiment

2.2.1. The Gravitational Torsion Balance Measures Gravity is Actually Measuring (with Help of) Reaction Force of Gravity

Cavendish's Gravitational Torsion Balance is one of the great experiments in the history of physics: the measurement of the gravitational constant, as performed by Henry Cavendish in 1798. He performed experiments with a torsion balance, measuring the gravitational attraction between relatively small objects in the laboratory.

The Gravitational Torsion Balance consists of two smaller masses suspended from a highly sensitive torsion ribbon and other two larger masses that can be positioned as required. The Torsion Balance provides a force delicate enough to counterbalance the tiny gravitational force that exists between the large and small masses by twisting a very thin beryllium copper ribbon.

The Gravitational Torsion Balance is oriented so the force of gravity between the small balls and the earth is negated. The large masses are brought near the smaller masses, and the gravitational force between the large and small masses is measured by observing the twist of the torsion ribbon. An optical lever, produced by a laser light source and a mirror affixed to the torsion pendulum, is used to accurately measure the small twist of the ribbon.

Three methods of measurement are possible: the **final deflection** method, the **equilibrium position** method, and the **acceleration** method.

Although the process and variables of the measurement of the three methods are different, the results are all obtained with the help of reaction force of gravitational attraction (the torsion of the beryllium copper ribbon).

2.2.2. Discussion of the LIGO experiment

Although, the LIGO experiment could provide richer and diverse information, however, since the LIGO experiment is based on presetting major premises that,

1) The gravitational force is wave (GW or de Broglie's wave),
2) The results should conform to the prediction of spacetime warping of GRT, it therefore is actually severed a hypothetical judgment.

Thus the structure and composition of LIGO and the theoretical basis for the analysis of the test results could be severely constrained by preconceived assumptions.

Of course, the information of the test signals can be only readout or transformed by a Laser interferometer, this also prejudicially and naturally forces the researchers to treat the acquired signals of gravitational force as wave, but not treat them as static signal.

The system looks being measuring the gravitational force signal, but actually the signals are obtained with the help of the reaction force of the gravitational force provided by the fabric wires to hang the test masses (mirrors).

The test results could not or may not exactly explain warping of spacetime of GRT and de Broglie's matter wave assertion.

2.2.3. Comments of Gravitational Torsion Balance and LIGO Experiment

The measured gravitational force signals are indirectly acquired. They are actually reaction forces of gravities.

The Gravities are proportional to the masses of the test masses, regardless what the materials are and what the geometric shapes of the testing objects are.

Therefore we could conclude that the gravitational forces are exerting directly on elementary particles of the matters (testing objects).

2.3. One Mistake in the Deduction of Warping of Spacetime is that It Takes Reaction Force of Gravitational Force as Gravitational Force Itself in Its Thought Experiment of Accelerating Laboratory Experiment

According to Newton's second law, the acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass. The mass and momentum of contacting ether are equivalent to the mass and momentum of the object upon which its force acts.

According to GRT, gravity is a warping of space time, the force of gravity arises from a warping of space time around a body of matter. An observer in a closed laboratory cannot distinguish between the effects produced by a gravitational field and those produced by an acceleration of the laboratory.

2.3.1. Refutation of Conjecture of Warping of Spacetime of GRT

Gravitational force caused acceleration is due to the gravitational force being exerting directly on element particles of matter.

Since the gravity is exerting on elementary particles (nuclear and electrons) of matter (including our human body), as shown on **Fig.2.3.1,** we can disclose that the general relativity theory **(GRT) mistakes reaction force of gravity as gravity itself, then inference its consequence wrong conjectures and conclusions.**

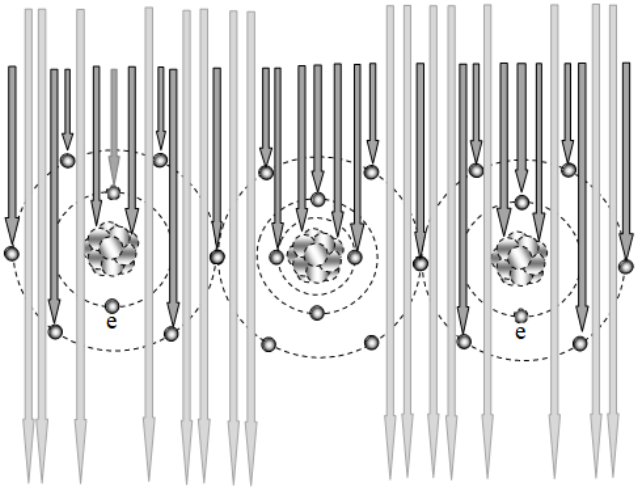

Figure 2.3.1a

Actually, when the gravitational forces are exerting directly on elementary particles (nuclear and electrons) of our body or matter, the reaction forces of gravities exert on the supporting point of the matter, e.g. foot or buttock of human body when he or she is standing or sitting. The reaction forces are accumulated by the internal forces in between nervous system of bones and muscles. As shown in **Fig.2.3.1b**.

In our daily lives, when we stand or sit down we never perceive the existence of gravity. In practices, what we sense is the reaction force of gravity. **We can only feel the reaction force and it is contact force but cannot feel gravitation (ether force) which is noncontact force that are exerting on internal elementary particles of our body.**

(The traditionally called contact forces in our level, are all thermal repulsive force actually, they are not acting on elementary particles but acting field over field.)

As the same reason, when a matter or building is laid on ground, the reaction force is come from ground (being contact force), and accumulated through the internal stresses from bottom to top of the matter and increasing from the top to the bottom from zero to the total weight of the matter or building.

When a body in an accelerated laboratory, since the reaction force of gravity is freed, and the gravity is actually ether force that are directly exerting on elementary particles that cannot be felt or perceived by macroscopic (human) body, thus we feel no force, therefore gravitational force seems neglected. In fact, actually, in an accelerated laboratory, it is the reacting force of the gravity disappeared but not the gravity disappeared.

When GRT takes the accelerated laboratory thought experiment, it get no way to measure gravitational forces and never notice or never clarify that the Cavendish's Gravitational Torsion Balance experiment actually measures gravity with help of reaction force of gravity, Einstein inexplicably takes it for granted that gravitational force disappeared in accelerated laboratory.

In fact, we never feel or perceive the gravitational force no matter we are on ground or in an accelerated laboratory. As shown in **Fig.2.3.1c**.

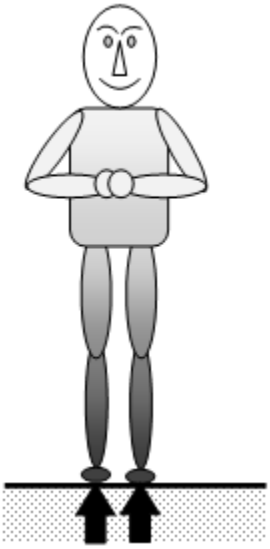

Figure 2.3.1b

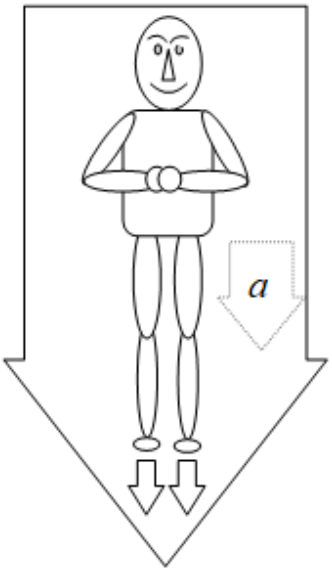

Figure 2.3.1c

Therefore the assertion of space time warping is a groundless mistake, it is based on a subjective imagine.

2.3.2. Conjecture of Warping of Spacetime is not Tenable Universally

Warping of spacetime cannot explain acceleration arises from other forces that can be felt or measured during acceleration motion, or the conjecture never takes other forces that can be sensed during acceleration motion into account.

For example, when a trailer is being pulled by chain of a tractor and moving in acceleration state, the contact force between the chain and the trailer is still existed and felt, where is the so called warping of spacetime?!

The GRT's explanation of gravitational force as being neglected in accelerated laboratory is due to wrongly taking the reaction force of gravitational force as gravitational force itself wherever, therefore it is groundless. So the conjecture of warping of spacetime is groundless.

2.4. Assuming Ether Being Present to Depict Pressure of Ether

The pressure of ether exerting on a matter (object), or exerting on directly on **nucleus** and **electrons of the matter** is similar to the buoyancy an object experiences in a liquid. The magnitude of the buoyant force (pressure of ether) equals the equivalent mass of ether displaced by the object. In other words, analogous to the buoyant force exerted on a submerged solid in a fluid, this pressure arises from a gradient in the ambient medium (ether). Specifically, mass induces a spatial variation in the tension or pressure within the surrounding (etheric field, with the gradient diminishing radially outward from the object's surface toward infinity. As shown in **Fig.2.4.1.**

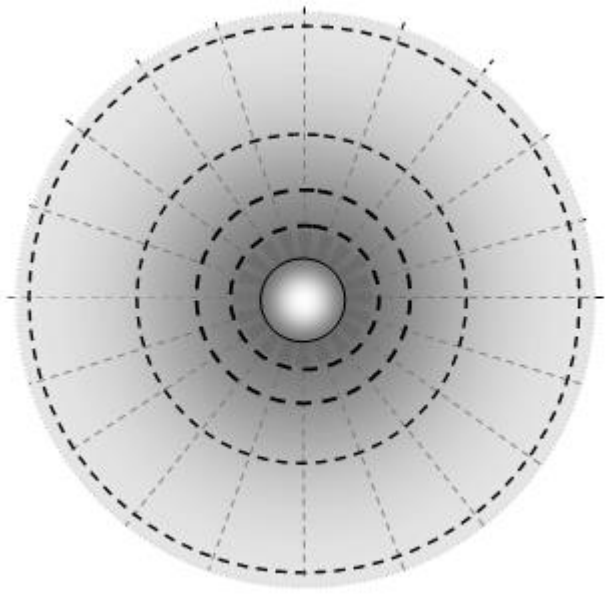

Figure 2.4.1

This ether pressure is blocked by the mass of the atomic **nucleus** and **electrons**, but it can pass through the gap between the atomic nucleus and electrons. The equivalent area that blocks this pressure is proportional to the mass. As shown in **Fig.2.4.2**.

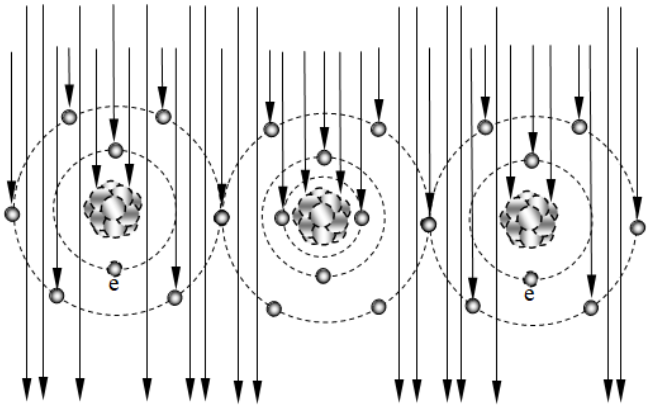

Figure 2.4.2

2.5. Assuming Ether is Present to Re-Explaining Gravitation

The gravitation is caused by net pressure from ether (medium), is not due to GRT claimed space time warping, as shown in **Fig.2.5**.

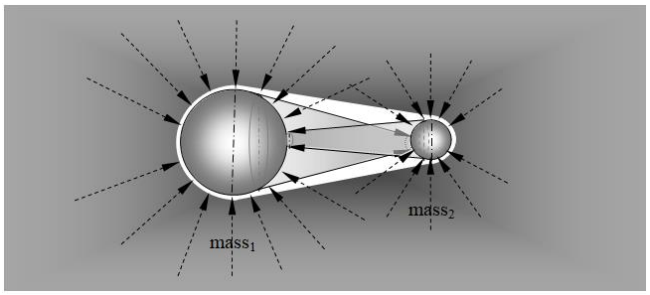

Figure 2.5

The equivalent gravitational forces actually exert on the system of $\boldsymbol{m_1}$ and $\boldsymbol{m_2}$ is that, due to the mutual obstruction of the co-towards directional ether pressure, a centripetal pressure between the two objects is formed. The centripetal pressures that tend to squeeze the two objects merge each other. This was previously understood as the gravitational force between the two objects,

2.5.1. Gravitational Force on m_1

The actual equivalent gravitational force that the m_1 experienced is the ether pressure on the left side minus the pressure between m_1 and m_2 on the right side. And the pressure on the left side in value is equal to the pressure on the right side that is blocked by m_2.

As shown in **Fig.2.5.1.1**. Here R_1 is effect radius of mass$_1$ m_1.

Because the ether force exerts on **nucleus** and **electrons** of the matter, therefore effect area $\boldsymbol{A}$ that blocks the ether force is proportional to mass. Therefore R_1 is proportional to m_1. R_2 is radius of mass$_2$ m_2, and R_2 is proportional to m_2.

Truncated (Frustrum) cone as shown in **Fig.2.5.1.2**, here, r is radius of plane face of the cone, and x is the distance between the plane face of truncated cone to the top of the

cone. A is the area of the plane face. P_{em} is pressure of ether caused by mass m.

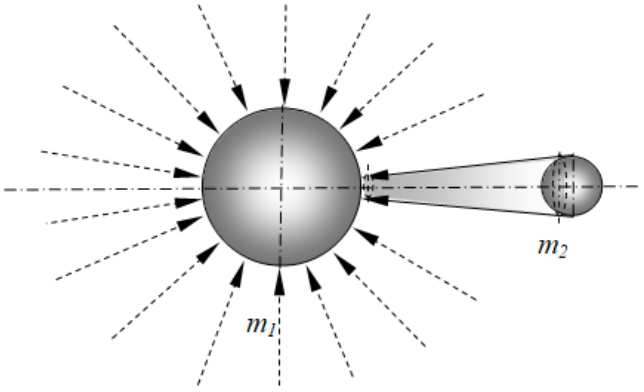

Figure 2.5.1.1

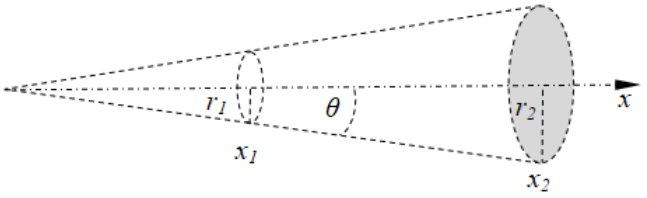

Figure 2.5.1.2

In **Fig.2.5.1.2**, r_2 proportional to m_2, r_1 depends on r_1, r_2 and x_2.

$$A_2 \propto m_2 \qquad A_2 = \alpha m_2 \qquad A_1$$
$$\propto \frac{1}{x_2} m_1 \qquad P_{em2}(x) = \int_{x_2}^{\infty} \beta \frac{m}{x^\gamma} dx$$

The effect gravitational force of m_2 to the m_1 should be

$$F_{2-1} = \int_{x_1}^{\infty} \beta \frac{1}{x_2} m_1 \frac{m_2}{x^\gamma} dx - \int_{x_1}^{x_2} \alpha m_2 \frac{m_1}{x^\gamma} dx$$

2.5.2. Gravitational Force on m_2

The actual equivalent gravitational force that the m_2 experienced is the ether pressure on the right side minus the pressure between m_2 and m_1 on the left side. And the pressure on the right side in value is equal to the pressure on the left side that is blocked by m_1.

As shown in **Fig.2.5.2.1**. Here R_1 is radius of mass$_1$ m_1, and R_1 is proportional to m_1. R_2 is radius of mass$_2$ m_2, and R_2 is proportional to m_2.

In **Fig.2.5.2.1**, r_2 proportional to m_2, r_1 depends on r_1, r_2 and x_2.

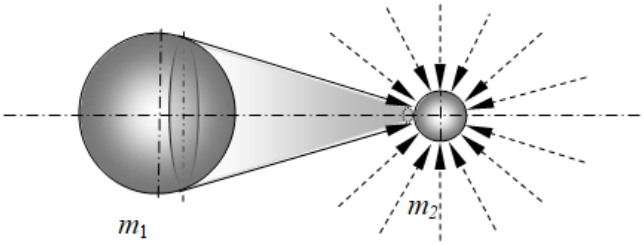

Figure 2.5.2.1

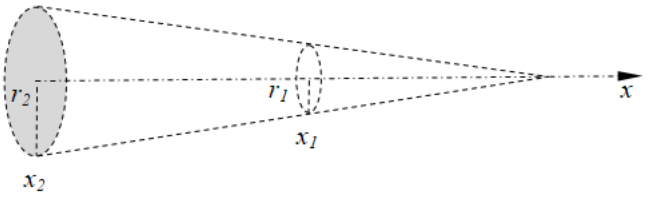

Figure 2.5.2.2

Truncated (Frustrum) cone as shown in **Fig.2.5.2.2**, here, r is radius of plane face of the cone, and x is the distance between the plane face of truncated cone to the top of the cone. A is the area of the plane face. P_{em} is pressure of ether caused by mass m.

In **Fig.2.5.2.2**, r_2 proportional to m_2, r_1 depends on r_1, r_2 and x_2.

$$A_2 \propto m_2 \qquad A_2 = \alpha m_2 \qquad A_1$$
$$\propto \frac{1}{x_1} m_2 \qquad P_{em2}(x) = \int_{x_2}^{\infty} \beta \frac{m}{x^\gamma} dx$$

The effect gravitational force of mass$_1$ to the mass$_2$ should be

$$F_{2-1} = \int_{x_2}^{\infty} \beta \frac{1}{x_2} m_1 \frac{m_2}{x^\gamma} dx - \int_{x_2}^{x_1} \alpha m_2 \frac{m_1}{x^\gamma} dx$$

As shown in **Fig.2.5.2.2**. Here R_1 is radius of mass$_1$ m_1, and R_1 is proportional to m_1.

2.5.3. Assuming ether is Present to Re-Explain the Gravitational Lens Effect

Bernoulli's equation as applied to an ideal fluid. It is often expressed as

$$P + \frac{1}{2}\rho v^2 = \text{constant}$$

This expression specifies that, in laminar flow, the sum of the pressure (P), kinetic energy per unit volume has the same value at all points along a streamline. The velocity v of movement of *EM* wave (ether wave) components must larger than zero (> 0), then the pressure P of ether decreases, therefore results in gravitational lens effect.

2.5.4. The Reason why the Speed of Gravitation is Same as the *EM* Wave Speed

Why the speed of gravitation is same as *EM* wave speed? this is because the *EM* wave is also mechanical wave of ether, and gravitation can be consider as a square wave or a step signal and step response of ether which comprised of series of wave of ether. Both *EM* wave and gravitation wave or field is propagated by ether, so their speed or velocity is exactly same.

2.6. Arguing Some Assertions of GRT by the way

2.6.1. Repulsion of GRT if Really Exists, Must be Newly Discovered Universal Static Thermal Repulsive Force

The energy-momentum tensor, the cosmological constant and etc, related to repulsion in GRT are all groundless with

no evidence and cannot be verified.

The newly discovered universal static thermal repulsive force (since year 2022) has evidences from almost all macro and microscopic areas.

So, the so called repulsion of GRT if really exists, must only be newly discovered universal static thermal repulsive force.

2.6.2. The Precession of the Perihelion of Mercury's Orbit is Effect of Thermal Repulsive Force

Precession is caused by external torque acted perpendicular to its axis of rotation. The precession of the perihelion of Mercury's orbit most likely is effect of thermal repulsive force. The Mercury is a planet made of various atoms, molecules and rocks, which is naturally cannot be constituted uniform, therefore its surface temperature is not uniformed. Under the action of not uniform universal thermal repulsive force from the Sun, the planet will be applied external torque, therefore experiences precession. It is just similar to the earth orbiting the Sun in elliptical orbit being due to imbalance of thermal repulsive force from the Sun on surface of earth.

3. Conclusions

1. As *EM* wave is proved must have medium to propagate, ether must present.
2. No absolute longitudinal wave and there is no absolution transverse wave.
3. Ether possesses pressure and gravitational force is effect of it.
4. The gravitational forces (we could call it ether pressure) are exerting directly on elementary particles (nuclear and electrons) of our body or matter. In our daily lives, when we stand or sit down we never perceive the existence of gravity. In practices, what we sense is only the reaction force of gravity which is contact force.
5. When a body in an accelerated laboratory, since the reaction force of gravity is freed, and the gravities are directly exerting on elementary particles (nuclear and electrons) that cannot be felt or perceived by macroscopic (human) body, thus we feel no gravitational force is present as well as in our daily living, and there is no reaction force of gravitational force in accelerating laboratory. Therefore the gravitational force seems neglected in accelerating laboratory of GRT. In fact, actually, in an accelerated laboratory, it is the reacting force of the gravity disappeared but not the gravity itself is disappeared. Actually, we never feel or perceive the gravitational force directly no matter we are on ground or in an accelerated laboratory. Therefore the assertion of space time warping is a groundless mistake, it is based on a subjective imagine.

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