Mathematical Expression of the Relationship between Spirit and Matter

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Abstract: A life is a single world, and each single world contains a spiritual world and a material world. Spiritual world and material world are orthogonal, and a single world can be expressed as a complex function. Observer’s universe is rotating, and the universe’s rotation is determined by the mathematical relationship between spirit and matter. All single worlds are superimposed to form a whole universe, which can be represented by a Fourier function expansion. This function can also be applied to ordinary things. Hubble redshift is changing, and is affected by the total number of lives, every single world’s energy, and the frequency of flashes in every life.

Key words: single world, spiritual world, material world, flash, Euler formula, Fourier series, redshift

When people are searching for dark matter, dark energy and parallel worlds in the universe, have they ever thought that our spiritual worlds can be quantified? If the spiritual worlds can be expressed mathematically, a different world view will be presented to people. Let’s find mathematical expressions from the relationship between spirit and matter, and then use them to solve some physical problems that have long been debated by people.

1 Function expression of single world

1.1 Vector expression of single world
When a person is thinking or feeling objects, we say that he has a spiritual world. All objective things that he thinks about or experiences are called a material world. Therefore, as a single world, a person has a spiritual world and a material world. This is in line with Chinese ancient philosophy that “the passive feminine cosmic being and the active masculine cosmic being make up the law of the universe” (Ren, 2013, p. 412). Assume that the vector \(\overrightarrow{OQ}\) denotes a single world; \(\overrightarrow{OS}\) denotes a spiritual world; and \(\overrightarrow{OM}\) denotes a material world. Hence, there is
\[
\overrightarrow{OQ} = \overrightarrow{OS} + \overrightarrow{OM}.
\]

We cannot use a ruler to measure anything in a spiritual world, nor can we use a scale to weigh anything in it, which means that there is no material in spiritual world. Similarly, in a material world, pen cannot think, and table cannot feel anything, which shows that there is no spirit in material world. Cartesian theory says “Human beings are composed of two independent entities, and the relationship between mind and body is similar to that between crew and ship” (Copleston, 2022, p.116). Since there is no material component in \(\overrightarrow{OS}\), and no spiritual component in \(\overrightarrow{OM}\), \(\overrightarrow{OS}\) is orthogonal to \(\overrightarrow{OM}\), that is
\[
\overrightarrow{OS} \perp \overrightarrow{OM}.
\]

Assume that \(Q\) is the norm of \(\overrightarrow{OQ}\), and it represents the single world’s energy. Using a spring as an analogy, the stretch length of the spring reflects the energy stored in the spring.
Fig. 1. Relation between $\overrightarrow{OQ}$, $\overrightarrow{OS}$ and $\overrightarrow{OM}$ in complex plane. When $\overrightarrow{OM}$ lies in the positive half of the real axis, the material world resembles a stretched spring; when $\overrightarrow{OM}$ lies in the negative half of the real axis, the material world resembles a compressed spring. The norm of $\overrightarrow{OM}$ represents the material world’s energy. $\overrightarrow{OS}$ also has the similar meaning as stated above. The different directions of $\overrightarrow{OQ}$ show the different states of the single world, which are synthesized by different $\overrightarrow{OS}$ and $\overrightarrow{OM}$.

Suppose that $q(t)$ is a complex function, representing $\overrightarrow{OQ}$ at time $t$, which is $\overrightarrow{OB}$ (Fig.1) at $t = 0$. Hence, we have

$$q(0) = OB = Q.$$  

A material world can be quantized, e.g., visible light can be decomposed into photons with frequencies of $3.8 \sim 7.5 \times 10^{14}$ Hz; a spiritual world can also be quantized, thinking or feeling is composed of one flash in series with another. Using a movie as an analogy, successive scenes are played in rapid succession from frame to frame. We divide a person’s 1-second thinking or feeling into $n$ equal parts, each of which is referred to as “flash”. Leibniz said, “Thousands of facts lead us to believe that there are an infinite number of continuous perceptions within us” (Copleston, 2022, p.318). Hence, $n$ is a big number. If every flash’s spiritual activity is measured
in imaginary unit ($j$), it can be represented as $j\omega_0$. Furthermore, we assume that $j\omega$ denotes the spiritual activity of 1-second thinking or feeling, and as a result $\omega = n\omega_0$.

Each flash’s duration is $\frac{1}{n}$. At No.1 flash, the single world is $q(0 + \frac{1}{n} \cdot 1)$. Since No.1 flash acts on the basis of $q(0)$, there is

$$q\left(\frac{1}{n}\right) = q(0) + q(0) \cdot j\omega_0 = Q \cdot (1 + j\omega_0).$$

At No.2 flash, the single world is $q(0 + \frac{1}{n} \cdot 2)$. Since No.2 flash acts on the basis of $q\left(\frac{1}{n}\right)$, there is

$$q\left(\frac{2}{n}\right) = q\left(\frac{1}{n}\right) + q\left(\frac{1}{n}\right) \cdot j\omega_0 = Q \cdot (1 + j\omega_0)^2.$$  

...  

At No. $nt$ flash, the single world is $q(0 + \frac{1}{n} \cdot nt)$. Since No.$nt$ flash acts on the basis of $q\left(\frac{nt-1}{n}\right)$, there is

$$q(t) = Q \cdot (1 + j\omega_0)^nt = Q \cdot \left(1 + \frac{j\omega}{n}\right)^n t. \quad (1)$$

Since $n$ is a big number, the following formula can be applied:

$$\lim_{n \to \infty} \left(1 + \frac{t}{n}\right)^n = e^t.$$  

Hence, equation (1) (abbr. Eq.1) is further written as

$$q(t) \approx Q \cdot e^{j\omega t}.$$  

School of Mathematical Sciences in Tongji University (2014) noted that Euler formula is

$$e^{xi} = \cos x + i \sin x,$$

so we have

$$Q \cdot e^{j\omega t} = Q \cdot (\cos \omega t + j \sin \omega t).$$

Assuming that $m(t)$ and $j \cdot s(t)$ respectively denote $\overrightarrow{OM}$ and $\overrightarrow{OS}$ at time $t$, we can express the vectors (Fig.1) by the following equations:

$$m(t) = Q \cos \omega t,$$

$$s(t) = Q \sin \omega t,$$

$$q(t) = m(t) + j \cdot s(t) = Q \cdot (\cos \omega t + j \sin \omega t).$$
1.2 As a higher dimension of reality

A material world is a three-dimensional space \((xyz)\), and \(x, y\) and \(z\) axes are orthogonal to each other. Since spiritual world is universal in reality (Fig.1), the three-dimensional space is incomplete, and single world can fully and accurately describe the real world. If the imaginary axis (abbr. \(Im\)) representing a spiritual world is added to the three-dimensional space \((xyz)\), then \(x, y, z\) and \(Im\) axes are orthogonal to each other. Thus, the spirit world should be thought of as a higher dimension of reality, and \(j\) is the basic unit of the higher dimension. String theory also says that perhaps “when we move in three-dimensional space, what we are actually experiencing is our true selves moving in ten or eleven dimensions of space-time. Just as our shadows follow us and move like us when we walk down a street” (Kaku, 2022, pp. 99-100).

According to the physical meaning of the second derivative, a single world’s motion acceleration is

\[
\frac{d^2q(t)}{dt^2} = \frac{d^2[Q \cdot (\cos \omega t + j \sin \omega t)]}{dt^2} = -\omega^2 q(t),
\]

where the negative sign indicates that the acceleration’s direction is opposite to \(\vec{OQ}\) and points to the center of the circle; and the acceleration’s size is \(\omega^2 |\vec{OQ}|\). This is a stable centripetal acceleration. Since an observer’s single world (\(\vec{OQ}\)) is his own universe, the observer’s universe rotates, which is determined by the mathematical relationship between spiritual world and material world. Geddel’s universe is also a model that resembles all of the universe rotating around a certain center (Wang & Dong, 2013, p. 278).

Around 1500 AD, Wang Yangming, aka Chinese sage was on an outing with his friends. A friend pointed to the wildflowers asked, “What does it matter to me that they bloom and fall in the mountain?” Wang Yangming replied, “They do not appear when you do not see them. When you see them, the colors come out. Therefore, the wildflowers are not outside your mind” (Wang, Y.M., 2018, p. 249). Now let’s apply the single world’s function to test the sage’s words. If a person neither sees nor thinks of the wildflowers, the wildflowers’ energy change in his spiritual world is zero, i.e.,
\[ ds(t) = 0, \text{ and then } \frac{ds(t)}{dt} = 0 \quad \text{holds. On the other hand, there is the following equation:} \]
\[ \frac{ds(t)}{dt} = \frac{d(Q \sin \omega t)}{dt} = \omega \cdot m(t). \]

Consequently, \( m(t) = 0 \) holds, i.e., the wildflowers’ energy in his material world is zero. In short, there are no wildflowers in his material world during that time.

2 \hspace{0.2cm} \textbf{Function expression of the universe}

2.1 \hspace{0.2cm} \textbf{Fourier series expansion of the universe}

Assume that \( \overrightarrow{OQ}_n \) denotes the single world of No.\( n \) life, and No.\( n \) life may be a person, bear, bird, fish, ant and so on; \( q_n(t) \) is a complex function, representing \( \overrightarrow{OQ}_n \) at time \( t \); \( Q_n \) denotes the norm of \( \overrightarrow{OQ}_n \), the energy of No.\( n \) life’s single world, and the amplitude of \( q_n(t) \); \( \omega_n \) denotes the angular frequency of \( q_n(t) \), and satisfied
\[
\omega_n = n\omega_0. \tag{2}
\]

Hence, \( n \) is still the number of flashes in 1 second. In short, we can derive the following function expression of \( \overrightarrow{OQ}_n \) as in Section 1:
\[
q_n(t) = Q_n (\cos \omega_n t + j \sin \omega_n t) = Q_n \cdot e^{j\omega_n t}.
\]

Assume that \( \overrightarrow{OU} \) denotes a whole universe; and \( u(t) \) is a complex function, representing \( \overrightarrow{OU} \) at time \( t \). Since a single world is expressed as a complex function and complex numbers can be added, single worlds can be superimposed, e.g., lightning is superimposed by DC current and AC currents of various frequencies; and white light is superimposed by monochromatic lights of different wavelengths. Many Worlds Interpretation also holds that the entire universe can be represented by a state vector, and that the overall state vector of the universe is actually the superposition of many sub-vectors (Capo, 2013, p. 248). Therefore, all single worlds are superimposed to form a whole universe, that is
\[
u(t) = \sum_{n=1}^{N} q_n(t) = \sum_{n=1}^{N} Q_n (\cos \omega_n t + j \sin \omega_n t) = \sum_{n=1}^{N} Q_n \cdot e^{j\omega_n t}, \tag{3}
\]
where \( N \) is the total number of lives in the universe. Since Eq.3 can describe the
universe, it can also describe things in the universe.

There is no spiritual world without life, and it is impossible to think or feel any objective things too, so we have

\[
\begin{aligned}
Q_n &= 0, \quad n \leq 0; \\
Q_n &= 0, \quad n > N.
\end{aligned}
\]  

Then Eq.3 is further extended to

\[
u(t) = \sum_{n=-\infty}^{\infty} Q_n \cdot e^{j\omega_0 t} = \sum_{n=-\infty}^{\infty} Q_n \cdot e^{jn\omega_0 t},
\]

where \( Q_n \) follows Eq.4.

“Fourier proved that any wave, no matter how complex its shape and range may be, can be synthesized by adding some sine waves of different wavelengths” (Cox & Forshaw, 2021, p. 89). Zhang, Xiong and Huang (2016) in *Signal and System* noted that the exponential form of Fourier series about a periodic signal is

\[
x(t) = \sum_{n=-\infty}^{\infty} X_n \cdot e^{jn\omega_0 t},
\]

where

\[X_n = X(n\omega_0) = \frac{1}{T} \int_{t_0}^{t_0+T} x(t) \cdot e^{-jn\omega_0 t} dt.
\]

Here, \( \omega_0 \) is the angle frequency of the fundamental wave; and \( T \) is the period of \( x(t) \); and then the following equation is established:

\[\omega_0 = \frac{2\pi}{T}.
\]

Consequently, \( u(t) \) also has an exponential form of Fourier series, which is exactly Eq.5, and

\[
Q_n = X_n = \frac{1}{T} \int_{t_0}^{t_0+T} u(t) \cdot e^{-jn\omega_0 t} dt.
\]

2.2 Human connection to the universe

Above all in the mathematical sense, Eq.3 is Fourier series expansion of the universe, i.e., the universe is unfolded into single worlds. If the effect of the Milky Way on us is approximately equal to the effect of the universe on us, then the period \( (T) \) of the cosmic rotation in Eq.8 is replaced by the period of the Milky Way’s rotation. The Milky Way is rotating, “our sun is located halfway from the center to the edge of the Milky Way, and it takes approximately 250 million years to complete one
revolution around the center of the Milky Way” (Bell, 2015, p. 130). Therefore, we get the following:

\[ T = 2.5 \times 10^8 \times 365.24 \times 24 \times 60 \times 60 = 7.89 \times 10^{15} \text{ s}. \]

Assuming that \( T_n \) is the vibrational period of someone’s single world \((\ddot{O}Q_n)\), we have

\[ \omega_n = \frac{2\pi}{T_n}. \tag{9} \]

In a person’s material world, the body is most affected by the spiritual world, and the most widespread periodic movement in the human body is the whole body’s blood circulation, so we take the period of the whole body’s blood circulation to be approximately equivalent to \( T_n \). A whole body’s blood circulation includes a systemic circulation and a pulmonary circulation, and “it takes about 25 seconds for red blood cells to pass through the systemic and pulmonary circulations” (Zhou, Sun & Xing, 2012, p. 51). Consequently, we get \( T_n = 25 \text{ s}. \) According to Eq.2, Eq.7 and Eq.9, we obtain

\[ n = \frac{T}{T_n} = \frac{7.89 \times 10^{15}}{25} \approx 3.2 \times 10^{14}. \]

It indicates that this person generates \( 3.2 \times 10^{14} \) tiny flashes in 1 second. The magnitude of \( n \) should come as no surprise, because “Dr. Pyotr Anokhin of Moscow University, who devoted his final years of his life to studying the brain’s information processing capacity, claimed that the number 1 followed by 800 zeros is greatly underestimated” (Buzan, 2015, p. 22).

If the effect of the solar system on us is approximately equal to the effect of the universe on us, then \( T \) is replaced by the period of the solar system’s rotation. “It takes 365.24 solar days for Earth to orbit once” (Gribbin, 2008, p. 116). Consequently, we get the following:

\[ T = 365.24 \times 24 \times 60 \times 60 = 3.16 \times 10^7 \text{ s}. \]

In the human body, the strongest cycle is the beating of the heart, so we take the cardiac cycle to be approximately equivalent to \( T_n \). “Each beat of the heart takes
approximately 0.8 seconds” (Zhao, 2011, p. 112). Consequently, we get $T_n = 0.8s$, and obtain

$$n = \frac{T}{T_n} = \frac{3.16 \times 10^7}{0.8} \approx 4.0 \times 10^7.$$ 

It indicates that this person generates $4.0 \times 10^7$ rough flashes in 1 second.

3 Reanalyzing the cause of Hubble redshift

3.1 Comparison of different galaxies’ spectral lines

Next, we apply the universe’s function to analyze the cause of Hubble redshift. In 1929 Hubble found that the extent of the spectral redshift of a galaxy is directly proportional to the distance from Earth, that is

$$z = K \cdot d,$$

where $z$ is extent of redshift, $K$ is constant, and $d$ is distance. By using the relation between Doppler shift and velocity of the light source, redshift of the spectral line is converted into recession velocity ($v$) of the galaxy, then Hubble got

$$v = H_0 \cdot d,$$

where $H_0$ is Hubble constant (Gao & Zhang, 2020, p. 150). As long as $d$ is large enough, $v$ will exceed the velocity of light ($c$), but such conclusion contradicts Special Theory of Relativity. “$c$ means the terminal velocity, which no real object can reach or exceed” (Yi, H.B., & Li, Z.M., 2009, p. 92).

Now we try to find the root cause of Hubble redshift again. When electrons surround the nucleus, they only have some specific energy levels. Once an electron jumps to a lower energy level, the difference between two energy levels will produce a unique photon from the atom. These photons are more than other nearby frequencies in a narrow frequency range, and they create a bright line in a uniformly continuous spectrum. Dark line is similar.
Fig. 2. Comparison of the spectral lines of different galaxies. Assume that A denotes a galaxy 10 billion light years away from Earth; B denotes a galaxy 7 billion light years away from Earth; and S denotes Earth; $L_A$, $L_B$ and $L_S$ are the same characteristic spectral lines of X element in galaxies A, B, and S that we have now obtained.

3.2 Application of the universe’s function

Assume that $E_A$ denotes the absorption energy corresponding to $L_A$; $E_B$ and $E_S$ are similar. Applying Eq.3, we derive $E_A$ in the material world as follows

$$E_A = \sum_{n=1}^{N} Q_n \cos \omega_n t = \sum_{n=1}^{N_A} [Q_{nA} \cdot \cos(\omega_n t_A)],$$

(10)

where $t_A$ is a time 10 billion years ago; $N_A$ is the total number of lives in the universe 10 billion years ago; $Q_{nA}$ is the energy of No.$n$ life’s single world 10 billion years ago. As can be seen from Eq.10, $E_A$ is constantly changing, and $N_A$, $Q_{nA}$ and $\omega_n$ cause such changes. Consequently, $E_A$, $E_B$ and $E_S$ are different even if the universe does not expand. Furthermore, Hubble redshift is changing, and is affected by the total number of lives, every single world’s energy, and the frequency of flashes in every life. “Nature’s laws may have changed over the history of the observable universe. People have been searching for proofs that the constants of the standard models have changed on the scale of cosmic time” (Unger & Smolin, 2015, p. 341).

$L_A$, $L_B$ and $L_S$ (Fig.2) reveal the following inequality:

$$E_A < E_B < E_S$$
Let’s make an analogy, a person wore cloth shoes from the first floor to the second floor 10 billion years ago; he wore iron shoes from the first floor to the second floor 7 billion years ago; and today he wears lead shoes when he goes up to the second floor. This shows that our universe is becoming stronger. By analogy with people’s dreams, dreams are sparse and thin at the beginning and then gradually vivid and dense.

Therefore, Hubble redshift does not reflect expansion of the universe, but rather the effect of life’s movement on the material world.

References

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