About Space-Time and More

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ABSTRACT

Intuitively, one can think that the time may be assimilated with the space. One of the big differences between the time and the space is the fact that actually travels into the past and/or future are only possible on movies. In science, Newton had introduced the notion of an absolute and universal time but Einstein told us that time is relative, is strongly connected with the space and depends on the observing point. In the theory of relativity, the gravitational field is assimilated with the 'space curvature' and has as independent variable the 'space-time'. To make a mathematical separation between the time and space, imaginary time had been considered. As living creatures must conceive mentally their future actions in space, may one consider this 'imaginary time' as a kind of 'mirror of these future actions'? The paper presents mathematical models for 1D to more than 3D space based mainly on trigonometric, hyperbolic, elliptic and ultra-elliptic functions. All these functions have only the 'complex time' as independent variable. They may represent a transformation (of the space for example) during a given time interval and/or equivalently, the 'dynamic of this transformation'. The time interval for a given transformation depends evidently on the used technology (then its 'speed') and as results, some locally parameters of the space (and/or objects) may be modified. The time may then be considered as equivalent to the 'order' in which a given transformation is realized. As application, extension of the bandwidth compression loop for 3D system may allow to a locally modification of some parameters of the objects and/or of the local gravitational field. Associated with a good and convenient technology, all these are of strategic importance. Applications may be found in strategic forecast, interplanetary telecommunications and treks. The presented tools may be used for modeling the fields and also insure their more comprehensive understanding.

Keyword: *Antigravity, Data protection, Electromagnetic Interaction, Fields, Gravity, Inertial, Information Analysis Technique, Information Processing, IS Evolution, Real-Time IS, Reliability of Information, Strategic Information, Time*

FROM 1D TO 3D SYSTEMS AND MORE

1D and 2D Systems

The well-known relations in 2D to convert the Cartesian coordinate into the polar one is:

$$\begin{cases} x = r \cdot Cos(\alpha) \\ y = r \cdot Sin(\alpha) \end{cases}; r = \sqrt[2]{x^2 + y^2}; \alpha = AcTan\left(\frac{y}{x}\right) \quad (1)$$

where r is the radius vector. In 2D, there are only 2 angles α, β connected by the relation:

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$$\alpha + \beta = \frac{\pi}{2} \tag{2}$$

In physics, the angles may be considered as functions of time. On the trigonometric circle, we may consider a constant angular speed ω for the angle α and a radius $r \equiv 1$. Then, we arrive to the (normalized) Euler complex analytic function:

$$e^{i\omega t} = Cos(\omega \cdot t) + i \cdot Sin(\omega \cdot t) \to i = \sqrt[2]{-1} \tag{3}$$

which is the kernel of the Fourier transform and:

$$\begin{aligned} e^{i\omega t} &= Cos(\omega \cdot t) + i \cdot \mathcal{H}\left[Cos(\omega \cdot t)\right] \\ &= Cos(\omega \cdot t) + i \cdot \frac{PV}{\pi} \cdot \int_{-\infty}^{\infty} \frac{Cos(\tau)}{t-\tau} \cdot d\tau \end{aligned} \tag{4}$$

Here, $\mathcal{H}\left[.\right]$ is the Hilbert transform and PV means 'principal value of the integral'. The Fourier transform is given by:

$$\begin{cases} \mathbf{F}\left\{s(t)\right\} = S(\omega) = \int_{-\infty}^{\infty} s(t)e^{-i\omega t} \cdot dt \\ \mathbf{F}^{-1}\left\{S(\omega)\right\} = s(t) = \frac{1}{2.\pi} \cdot \int_{-\infty}^{\infty} S(\omega)e^{i\omega t} \cdot d\omega \end{cases} \tag{5}$$

It may be observed that $S(-\omega) = S^*(\omega)$ for any real signal, $\mathbf{F}\left[\mathcal{H}\left[s(t)\right]\right] = i \cdot \text{sgn}(\omega) \cdot S(\omega)$ and $S^*(\omega)$ is the complex conjugate of $S(\omega)$. The Dirac function $\delta(t)$ is defined by:

$$\delta(t) = \frac{d(Sgn(t))}{2 \cdot dt} = \frac{d\left(\frac{t}{|t|}\right)}{2 \cdot dt} \tag{6}$$

Then, the equivalent spectrum of this Dirac function is:

$$S_{\gamma}(\omega) = \int_{-\infty}^{\infty} \delta(t)e^{-i\omega t} \cdot dt = 1(\omega) \tag{7}$$

It can be remarked that for this function which has non-zero values only for $t \equiv 0$, its spectrum implies all the frequencies. This is in accordance with:

$$\mathbf{F}\left\{s(a \cdot t)\right\} = \frac{1}{a} \cdot S\left(\frac{\omega}{a}\right) \tag{8}$$

with 'a' a real coefficient.

Any real signal has a complex spectrum including positive and negative frequencies but a complex analytic signal has a spectrum including only positive frequencies. The complex conjugate of a complex analytic signal spectrum will include only negative frequencies. The Euler complex analytic function $e^{i\omega t}$ may represent a spinning vector with an angular speed ω. This may be put in conjunction with a gyroscope and/or a spinning particle. Then, the function $e^{-i\omega t}$ may represent an 'inverse spin speed'.

The energy of a particle may be represented by:

$$\begin{cases} W_a = \vec{F} \bullet \vec{s} = m \cdot \vec{a} \bullet \vec{s} \\ W_v = \frac{m \cdot v^2}{2} \\ W_f = h \cdot f \end{cases} \tag{9}$$

where m is the mass, v the speed of the particle, $.\vec{a}$ its acceleration, $\vec{s}$ the space, h the Planck's constant = 6.626068 × 10^{-34} m^2 kg / s, f the 'spin frequency' and '$\bullet$' signify the vector dot product.

In rotation, $\vec{v} = \vec{\omega} \times \vec{r}$ where $\vec{r}$ is the position vector of the particle, $\vec{\omega}$ its angular velocity and '$\times$' signify the vector cross product. Then:

Citizen Journalism: How Technology Transforms Journalism Business through Citizen-Reporters in Nigeria

Olubunmi P. Aborisade, Caroline Howard, Debra Beasley and Richard Livingood (2011). *International Journal of Strategic Information Technology and Applications (pp. 1-11).*

www.igi-global.com/article/citizen-journalism-technology-transforms-journalism/54706?camid=4v1a

The Role of Information Architecture

(2013). *Applying Principles from IT Architecture to Strategic Business Planning (pp. 153-161).*

www.igi-global.com/chapter/role-information-architecture/70909?camid=4v1a