International Journal of Pure and Applied Physics.
ISSN 0973-1776 Volume 14, Number 1 (2018), pp. 45-49
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The Tentative Viewpoint about Connectivity and Traversability of Spacetime

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Abstract

This article is committed to further exploration of the nature of spacetime. Based on Hamilton principle and the real path so determined, the author proceeds with further discussion on the nature of this real path according to Hamilton tensor equation, and thus reveals the correspondence among the tensor distribution, physical space and real path, on this basis the author defines two categories of spacetime and also depicts their connectivity and traversability respectively.

Keywords: Hamilton principle, Real path, Hamilton tensor equation, Spacetime, Connectivity, Traversability

1. INTRODUCTION

According to Hamilton principle, as far as the holonomic system is concerned, the movement that enables the Hamilton action quantity to be the stationary value is the only movement that really occurs in the system, beyond that all the other movements if any would just occur possibly rather than really. Then what on earth would this only real movement indicate or signify? The author would thus further explore the nature of spacetime from this way out.

2. THE HAMILTON PRINCIPLE AND THE REAL PATH SO DETERMINED---THERE IS BUT ONE REAL PATH

According to the relevant literature[1], Hamilton Principle is the variation principle which is applicable to dynamic holonomic system, which can be formulated as follows

$$\delta S = \delta \int_{t_1}^{t_2} L(q, \dot{q}, t) dt = 0 \qquad (1)$$

That is to say, as far as the holonomic system is concerned, among all the possible movements of the system the movement that enables Hamilton action quantity S to be the stationary value should be the one that really occurs in the system, which could be referred to as the real path and there's but one real path and its motion equation is

$$\mathrm{q_j} = \mathrm{q_j(t)}, \mathrm{j} = 1,2, \dots, \mathrm{N} \qquad (2)$$

While under the same conditions any possible motion of the system close to the real motion as permitted by the constraints could be referred to as the possible path or virtual path. The virtual path is countless and its motion equation is

$$\tilde{\mathrm{q}}_\mathrm{j} = \mathrm{q_j(t)} + \varepsilon_\mathrm{j}\eta_\mathrm{j}(\mathrm{t}), \mathrm{j} = 1,2, \dots, \mathrm{N} \qquad (3)$$

Therefore the Hamilton Principle should represent the law of locating the real movement from all possible movements, or the law which determines the real path out of countless virtual path.

3. THE HAMILTON TENSOR EQUATION AND THE REAL PATH SO DETERMINED---THE REAL PATH IS THE PHYSICAL SPACE OF TENSOR DISTRIBUTION

According to Hamilton tensor equation i.e. Extended Hamilton principle, referring to the relevant literature[1][2][3], the nature of real path could be further revealed that the real path is just the physical space as determined by the energy-time tensor distribution or momentum-coordinate tensor distribution, this two tensor distributions are to be obtained by solving Hamilton tensor equation, and in such physical space an object would not be restricted by any forces including speed of light and would conduct a free motion, and thus it means that in such physical system some sort of correlation of overtaking speed of light could be realized. In the meanwhile, considering the speed of light actually represents the sort of spacetime limit, which is the limit of movement of space relative to time, the system of super light speed so produced may even surpass the limit of space or time itself and achieve a kind of

movement with somewhat absolute freedom, and the real path is just such physical space system. Thus it can be deduced that there should be a one to one correspondence among the tensor distribution, the physical space so produced and the real path. Furthermore, in view of the two tensor distributions as indicated above, there should be two categories of physical space or spacetime accordingly and the corresponding real paths, which can be further interpreted as follows.

(1) The first category of spacetime---The spacetime with connectivity in space

The action equation of the first category of spacetime is the Hamilton tensor equation with respect to energy-time tensor distribution, that is

$$H_{\mu\nu} = \delta \int_{t_1}^{t_2} E(q, \dot{q}, t) dt = kZ_{\mu\nu} \qquad (4)$$

The left side of equation is referred to as the Hamilton state which represents the virtuality of spacetime, and the right side is the energy-time tensor distribution which means that it's the virtuality of spacetime that determines its energy-time tensor distribution, and thus the system could achieve the very movement with absolute freedom as stated above, that is, the energy's distribution i.e. energy-time tensor distribution is to be only determined by the virtuality of spacetime and is not to be subjected to any restrictions including that of the space itself.

Considering the correspondence between the tensor distribution and real path, now that the real path as determined by energy-time tensor equation would not be subjected to any restrictions including the space itself, the instant connectivity of space could be achieved on this real path, that is, on this real path the instant correlation of super light speed could be realized, and this real path is actually the physical space as determined by energy-time tensor distribution which is to be obtained by solving Hamilton energy-time tensor equation, and in this physical space the time can connect space instantly and that very movement with absolute freedom and without any restrictions in space could then come true. Realistically, a spacecraft would be able to travel in space freely at a velocity of super light speed if it were to be navigated on this real path, and if this can be realized it's possible that interplanetary travel could be conducted in a comparatively short time, which includes the travel aiming to the galaxies outside the solar system. Likewise, if a signal were to be transmitted along with this real path the interplanetary telecommunication could then be realized.

(2) The second category of spacetime---The spacetime with connectivity in time

The action equation of the second category of spacetime is the Hamilton tensor equation with respect to momentum-coordinate tensor distribution, that is

$$H_{\alpha\beta} = \delta\int_{q_1}^{q_2} p(q,\dot{q},t)dq = kZ_{\alpha\beta} \qquad (5)$$

The left side of equation is referred to as the Hamilton state which represents the virtuality of spacetime, and the right side is the momentum-coordinate tensor distribution which means that it's the virtuality of spacetime that determines its momentum-coordinate tensor distribution, and thus the system could achieve the very movement with absolute freedom as stated above, that is, the matter's distribution i.e. momentum-coordinate tensor distribution is to be only determined by the virtuality of spacetime and is not to be subjected to any restrictions including that of the time itself.

Likewise, considering the correspondence between the tensor distribution and real path, now that the real path as determined by momentum-coordinate tensor equation would not be subjected to any restrictions including the time itself, the coexistent connectivity of time could be achieved on this real path, that is, on this real path the past, now and future could coexist in one same space, or exactly, this real path would not be limited by the "arrow of time" as it is not subjected to any restrictions including that of the time, and this real path is actually the physical space as determined by momentum-coordinate tensor distribution which is to be obtained by solving Hamilton momentum-coordinate tensor equation, and in this physical space the space can connect time in a coexistent way and that very movement with absolute freedom and without any restrictions in time could then come true. Realistically, a spacecraft would be able to travel in time freely from now to past or future if it were to be navigated on this real path, and if this can be realized it's possible that time traversing could be realized in space. Likewise, if a signal were to be transmitted along with this real path the telecommunication traversing time could then be realized.

The two categories of real paths as determined by Hamilton tensor equation could thus be interpreted as above and the author believes the relationship between this two categories of real paths and the real path as determined by Hamilton principle could be interpreted as follows:

The real path as determined by Hamilton principle can be referred to as the resultant path where energy, time, momentum and coordinate are to be integrated into oneness and thus the so called virtual space is to be produced, and the two real paths as determined by Hamilton tensor equation could then be deemed as the corresponding component paths, one of them can be called as energy-time path and the other called

as momentum-coordinate path, which constitute the energy-time tensor space and momentum-coordinate tensor space respectively.

4. CONCLUSION

According to the above discussion, there should be two different categories of spacetime, which are the spacetime with connectivity in time and the spacetime with connectivity in space respectively. The connectivity in nature means some sort of correlation of super light speed that can be further defined as instant connectivity of space and coexistent connectivity of time respectively, which would respectively occur on the two real paths as determined by Hamilton tensor equations, and thus on the real path the sort of movement with absolute freedom as stated above could be realized and the travel traversing space and time is to be possible.

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