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The analogy of equation of rotation in complex plane with the Dirac equation, and its foundation

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Quantum mechanics is based or formulated on postulates. The first postulate states that the state of quantum mechanics system is defined by the wave function. The Schrödinger equation has the form of a differential equation describing the evolution process of the function. Dirac equation is derived on the base of that postulate of wave function evolution in addition to Dirac's proposed linearized Hamiltonian form.

Within the frame of Dirac's relativistic quantum theory, Hestenes in 1990 refers the complex wave function to a kinematic origin (Zitterbewegung), and Arminjon argued that Dirac field is a complex vector field.

The present project is not in quantum mechanics. It tries to propose a mathematical model. This model is based on the mathematical foundations of the complex phase factor and the complex vector, those has been proposed by Hestenes and Arminjon. The model is a complex vector in terms of complex phase factor. The project is in two parts. The first tries to find analogy between time differentiation of the complex vector and the position-space Dirac equation. The second tries to find a physical explanation for the complex vector.

In the first part, the equation of time differentiation of the complex vector shows analogy with the Dirac equation form. The two obtained coefficients those corresponding to the Dirac coefficients have similar properties of those of Dirac. These two coefficients are related to the rotation of the point. The second derivative of the complex vector shows analogy with Klein-Gordon equation.

In the second part, the complex vector is considered in trigonometrical form. That led to assume a general real algebraic form for the complex vector, and the complex vector is a special case of the real form. The real trigonometrical form exhibits a real kinematical model. Transformation from real kinematical model to complex form is attributed to partial observation, which is an empirical problem. Sanduk in 2012 proposed the partial observation as an empirical technique for that transformation.

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Summary

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