Corpuscular-Wave Dualism or Mathematics-Physics Confluence

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Abstract

The set-theoretic conception dominating still in mathematical researches together with its advantages creates some difficulties both in trying any mathematical problems and in case of application of mathematical methods in adjacent sciences, namely in Physics. These difficulties may be illustrated basing on approaches to solving any problems of quantum, classical and relativistic mechanics.

1. In general relativity theory proceed from action $A = \int L d\tau$ giving on the space-time continuum (X, T). Thereupon seek extremum among continuous curves and come up to a variational-Lagrange equation. As far as to extend the class of "curves" among which the extremum we found - for semimartingales, we are forced the class of actions to narrow.

The difficulties consist of that the differential for semimartingales has the formal character and the integral in the classical sence is impossible to define. And what is more undesirable, the statement of variational problem in generally within the bounds of classical and stochastic analysis is impossible and as the consequence we have the poorness of facts confirming results of (relativity) theory. More deeply, the classical (smooth) and stochastic analysis are the first two steps of using well-known Taylor formula which bears non-recurrent character not to mention its artificial receipt.

2. The starting point of quantum theory is the postulate, that the state of quantic system may be described by integral $\int \Psi^2 dx$ with density of probability Ψ^2. More generally, one may introduce the distribution of particles $\Psi^2 dx = P\{\xi \in dx\}$ or $P\{\xi \in A\} = \int_A \Psi^2 dx$ for any random variable ξ marking preassigned particle.

Up till now is being fixed ξ (i.e. particle) and studied the probability $P\{\xi \in A\}$ by vary point-set A (statistical approach), or is being presented Ψ as the wave function and studied corresponding (Schrodinger) equation (quantum mechanic approach). Though, by experiment we vary the participant particles.

3. By tradition we must give to classical mechanics its habitual place among quantum and relativistic mechanics. The facts that the classical mechanics is the first degree of approximation for relativistic theory and the particle-wave dualism take place, act the classical mechanics again a background of quantum and relativistic mechanics in general theory.

We realize the laid down program in some directions:

a) Instead of Taylor formula we treat the Stair-step method and come to "geodesics" – appearing key notion on the way to Newton equation in classical mechanics and Einstein gravitational field equation in general relativity theory.

b) In abstract *G*-space X with monoid G we construct Riemann line integral (in generally, "non-convergent") and study usually its properties.

c) Based on the results of point-set theory we introduce the diffusion (blur) sets and together with quantitative (probability) give qualitative (measurability) characterizations of physical phenomena.

Summarising aforesaid we go to "space-time-possibility" universe $U = (X, T, \Omega)$.

Introducing the (stochastic) line integral $\int_U F(u, du)$ we study the above mentioned problems in frame of corresponding theory.

Yours Faithfully

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