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Analog of Planck's constant for a colloid system

© **Boris A. Markov**,[1] and **Yury I. Sukharev**[2*+]
[1] *Department of Computational Mathematics. South Ural State University – National Research University (NRU). Lenin Ave., 76. Chelyabinsk, 454080. Russia.*
[2] *Department of Solid State Chemistry and Nanoprocesses. Chelyabinsk State University. br. Kashirinykh St., 129. Chelyabinsk, 454000. Russia. Phone: +7 (9634) 60-27-75. E-mail: Yuri_Sucharev@mail.ru*

*Supervising author; +Corresponding author

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Abstract

Based on the assumption of the instability of the colloidal state caused by the movement of charged particles, we previously obtained equations characterizing the structure of the colloid: a Schrödinger-type equation that defines the redistribution of thermal and potential energy in the colloid and a material equation – the diffusion equation with the Liesegang operator, which is connected directly with the substance, allowing find breaks in structures caused by vibrations of electrically charged particles. Such effects for colloidal chemical manifestations are called macroscopic quantum effects. That is, macroscopic quantum effects are a combination of phenomena in which the characteristic features of quantum mechanics are directly manifested in the behavior of macroscopic, for example, colloidal objects. As a rule, the behavior of macroscopic objects contains a large number of atoms and is described with high accuracy by the equations of classical physics, which do not include the characteristic quantum value – the constant bar.

Based on the equations constructed by the authors, which are the equations of plasma hydrodynamics, a mathematical model is created that reduces the colloidal system to an equation similar to the Schrödinger equation and calculates a certain constant that is an analogue of the Planck constant for macroscopic colloidal systems and computes the constant of this equation $\lambda = \sqrt{\frac{4\pi\rho_0 m_1}{q_2}}$, which is equal in magnitude $\lambda \approx 2\cdot 10^{-10}$. It differs significantly in magnitude from the Planck constant, because it characterizes the already complex macroscopic quantum oxyhydrate colloidal system.

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