http://mmg.tversu.ru ISSN 2311-1275

Mathematical Modelling and Geometry

Volume 10, No 3, pp. 1 – 15 (2022) **Full text**

Quantum Foundations and Energy Distribution Processes of Inner Oscillations

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Abstract. We consider the problem of computing energy distribution of inner harmonic oscillations of a nanoparticle in its phase space, when the particle moves in a medium under certain temperature. It is assumed that the particle obeys the Brownian motion under the action of the medium and the force field given by a potential function. In the present paper we provide and study an equation describing the problem, generalizing the Klein-Kramers equation. It is shown that for large value of medium resistance, the process of energy distribution of inner harmonic oscillations of the nanoparticle is represented as the composition of a rapid transition process and a slow process. After the rapid transition process, the system goes to a quasi-stationary state. The slow process is approximately described by the standard Schrodinger equation used for description of quantum processes. Thus, the process can serve as models of quantum processes.

Keywords: waves in phase space, brownian motion, Klein–Kramers equation, asymptotic solutions

MSC numbers: 81Sxx, 35Q40, 81Pxx, 81Q65

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