CONTROLLING A LOW-TEMPERATURE DIFFUSION OF THE PARTICLES ON THE LATTICES USING TIME-PERIODIC FIELDS

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As a rule, the temperature drop results in the abated diffusion and it complicates the control of diffusion processes at low temperatures. However, some systems enhance the diffusion with the temperature drop [1-2]. This phenomenon is called the temperature-abnormal diffusion and it enables the variation of a diffusion coefficient in selected directions raising no temperature.

Herewith, we present original theoretical data on enhancement of the diffusion of underdamped Brownian particles in the symmetric space-periodic potential exposed to the external time-periodic force.

In this talk a set of original theoretical results on diffusion enhancement of underdamped Brownian particles in symmetric space-periodic potential due to external time-periodic forcing is presented [3-7].

We investigated abnormal diffusion enhancement with the temperature drop in external time-periodic fields. It was established that the diffusion enhancement considerably depends on the field amplitude F_e and the frequency ω. The range of F_e and ω values in which the diffusion is enhanced with the temperature drop is defined by dissipation properties of the system.

We showed that the diffusivity can be enhanced by many orders of magnitude at appropriate selection of the force amplitude and frequency.

The effects studied can be used by new technologies for the production of artificial structures.

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