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Resonant excitation of oscillator with randomly shifted levels

A. P. Dmitriev[1)]

Ioffe Institute, 194021 St. Petersburg, Russia

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In this work, we have solved the problem of resonant excitation of a harmonic oscillator, the levels of which are slightly shifted. Level shifts are considered random and uncorrelated. It is shown that in this situation there is a threshold value of the exciting resonance field, below which the excitation is localized at the lower levels, and above which the oscillator is excited indefinitely, so that dissipative processes must be taken into account. The problem is reduced to the problem of a particle moving along a periodic chain with random levels and an overlap integral between the nearest neighbors that increases along the chain in proportion to the root of the distance. The calculations used some results of the theory of one-dimensional localization. A similar method is used to analyze the motion of an electron in a disordered quantum wire with a cross section increasing along it. It is shown that in the case of a superlinear increase in the cross section with length, localization is absent and the resistance tends to a finite limit, in the opposite case, localization takes place and the resistance increases exponentially, and with a linear increase in the cross section, it grows with a power-law length way.

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[1)]e-mail: pavel.alekseev@mail.ioffe.ru