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Distribution function of random electric fields in disordered ferroelectrics thin films VLADIMIR STEPHANOVICH, ELENA KIRICHENKO, Institute of Mathematics and Informatics, Opole University — We present the calculation of first moment E_0 and variance ΔE of distribution function of random fields in a ferroelectric of finite size. This defines completely the distribution function in gaussian limit. Specific calculations have been performed for the case of slab-shaped ferroelectric thin film. We have shown that E_0 and ΔE can be expressed through the integrals from first and second degree of Green's function of such confined geometry ferroelectric in k - space. To obtain the Green's function, we solve the differential equation minimizing Landau free energy of a ferroelectric with respect to the boundary conditions on its surfaces. We show, that the distribution function of random fields in the finite-size ferroelectric differs from that of the unbounded bulk material. For example, both E_0 and ΔE depends on film thickness L. Knowledge of this distribution function permits to calculate the observable physical properties of ferroelectric thin films made from ferroelectric relaxors. Our method of calculation of $E_0(L)$ and $\Delta E(L)$ can be easily generalized for ferroelectric of arbitrary shape.

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