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Calculations of anomalies in properties of relaxor ferroelectric films MAYA GLINCHUK, EVGENIY ELISEEV, Institute for Problems of Materials Science, NAS, Kiev, Ukraine — For the first time, we have calculated the properties of thin relaxor ferroelectric films in a framework of random field theory allowing for a misfit strain between the film and a substrate via surface piezoelectric effect, that causes a built-in electric field in the strained films. We demonstrate that this misfit-induced electric field, as well as the random electric fields created by randomly distributed electric dipoles and charged defects, lead to a smearing of ferroelectric phase transition, namely, they wash out a dielectric susceptibility maximum and a spontaneous polarization temperature dependence. As an example, a dependence of an order parameter and the dielectric susceptibility on the film thickness, temperature, and random fields distribution function was obtained. For the first time, we have shown that a frequency dispersion of susceptibility temperature maximum in relaxor thin films obeys modified Vogel-Fulcher law. In the proposed modified Vogel-Fulcher law the freezing temperature and activation energy depend on the film thickness, namely, freezing temperature decreases and activation energy increases with film thickness decrease. The obtained results quantitatively agree with the available experimental data for $PbMg_{1/3}Nb_{2/3}O_3$ relaxor thin films.

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