

Transitional processes in a incommensurate superstructure in the surface energy field



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In this work, we construct bifurcation diagrams that illustrate the occurrence of chaos by the method of doubling the period for ferroelectric crystals with multiplication of the unit cell n = 5. To do this, we calculated the amplitude function of the incommensurate (IC) superstructure described by two differential equations.



Fig.1. Branching diagram a-b); diagram of the mapping function c), when the parameter K describes, which describes the anisotropic interaction, and is determined by the Dzialoshinsky invariant at a constant value of the long-range interaction (parameter T).

It is established that at small values of long-range interaction (T < 0.05) there is an undeveloped chaotic state characterized by blurred processes of frequency

doubling (*Fig. 1*). According to the diagrams of logistics functions, the influence of surface energy on the incommensurate superstructure causes an increase in the magnitude of the anisotropic interaction, which leads to the removal of the degeneracy of the system.

Therefore, the surface energy for the IC superstructure arising in ferroelectric crystals with the multiplication of the unit cell n = 5 removes the degeneracy of this system.

