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Dynamic periodical distortions of stripe domains in garnet films (abstract)

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One of the problems arising in the development of VBL memory is to make stripe domains (SD) resistant to bending distortions. The paper considers a theoretical and experimental study of the mechanism of bending sinusoidal distortions of isolated SD caused by the sequence of bias fields (Hz) spatially homogeneous pulses compressing SD. The SD distortion dynamics was studied by the method of high speed photography with exposure of 10 ns. The SD critical width has been discovered. When reached, it first causes small distortions of the domain wall (DW). Further effects of the Hz pulses increases them, and after 10–12 field pulses the irreversible statically stable sinusoidal distortions of SD are finally formed. After that each subsequent Hz pulse just inverts the spatial structure of the distortions (i.e., transfers it from one bistable sin kx-type state to another: $-\sin kx$). The performed theoretical analysis shows that the above effect is connected with the DB structure transformation observed when some critical SD width w^* is reached. It has been experimentally discovered that the formed bending distortions of SD remain stable during the effect of the Hz pulse where SD width $w > w^*$, and tend to straighten when width $w < w^*$ is reached. The sequence of the above changes in the DW structure leads to the transition from one bistable state to another through an intermediate state with a small SD width. Experimentally found has been a close-to-linear dependence of spatial amplitude of distortions on the value of Hz. It has also been discovered that the distortions period and amplitude linearly increase together with the duration of Hz. The relation between the time of reaching w^* and time of bending formation has been established.

Quasiperiodical effects of the Bloch lines distribution (abstract)

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The purpose of this work is to clear out the reasons of Bloch lines (BL) clustering in plane 180° domain boundary (DB) of the standard ferromagnet with the quality factor $Q \gg 1$. The reason for that may be the complicated orthorhombic anisotropy $b(\theta,\varphi)$, caused by the growth particularities of the sample defects and nonhomogeneities due to local changes of the lattice constant and the composition. Here θ, φ are spherical coordinates of the magnetization vector. The exact (in this approximation) analytical decisions for an isolated BL in DB as well as the number of Bloch lines were obtained. In the last case the sections with increased BL's density may appear. In this place DB is narrowed and its density increased. For the other side, this situation is modeled for the case when Bloch lines are spaced on the Gauss law: $S_n = S_0[1 - \exp(-n^2/2p)]$, where S_0 is the distance between periodically spaced BL, from [1] l, $S_0 = 4.51$, here l is Bloch line's width; n is BL's number. In this model the magnetization distribution and energy density of DB were calculated numerically. In particular, it was found out that the energy density near the cluster's center from the BL's quantity N increases in accordance with the complicated law similar to N^2, and the average DB energy density approximating $2.2E_0$ value, where $E_0$is DB without BL energy density. There $N \sim 2(2p)^{1/2}$.

[1] A. Hubert, *Theorie der domänenwände in Geordneten medien* (Springer, New York, 1974).

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