Publikationen 1989

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THE POINT DIPOLE APPROXIMATION IN MAGNETIC FORCE MICROSCOPY

Image interpretation in magnetic force microscopy (MFM) requires detailed information about the internal microstructure of the ferromagnetic tip used for probing the surface microfield of a sample. Since these informations are generally not experimentally available, image interpretation is more speculative than rigorously quantitative at the present time. This theoretical analysis confirms by a simple criterion that MFM image interpretation can be performed in terms of point dipole probing provided that some experimental constraints are satisfied. The validity of the criterion is demonstrated for various experimentally relevant examples.

*Phys. Lett. A **137**, 475 (1989)*

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BIT ANALYSIS OF MAGNETIC RECORDING MEDIA BY FORCE MICROSCOPY

A simple theory is presented characterizing the effect of finite tip size and varying tip magnetization on the imaging of bit patterns in longitudinal recording media by magnetic force microscopy. The results provide important criteria for optimization of the bit read-out performance on the one hand and indicate a new method of determining the effective size and magnetization of a given microscope tip on the other hand.

*Phys. Stat. Sol. (a) **115**, 285 (1989)*

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ANALYSIS OF BLOCH-WALL FINE STRUCTURES BY MAGNETIC FORCE MICROSCOPY

Microfield profiles of isolated 180° Bloch walls in highly perfect iron single crystals have been detected using a magnetic force microscope (MFM). The achieved spatial resolution of 10 nm permits a first quantitative insight into the near-surface variation of the stray field. A closer analysis of the experimental data by comparison with model calculations confirms some fundamental uncertainties in image interpretation generally inherent to the MFM technique. The basic problems are summarized as a general guideline for the applicability of the MFM technique.

*Phys. Rev. B **40**, 7421 (1989)*

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INTERNAL STRUCTURE OF TWO-DIMENSIONAL DOMAIN WALLS IN FINITE BULK CRYSTALS

The two-dimensional structure of a 180° Bloch-type interdomain boundary in the near-surface region of bulk crystals of finite thickness is derived by an approximate analytic solution of the constitutive micromagnetic equations. The symmetrical equilibrium wall structure is characterized by an extensive flux closure internal to the crystal and a compressed charge distribution on the crystal surface. It is found that the magnetostatic energy term is the principal stabilizing factor that prevents a 180° Bloch wall, even in non.magnetostrictive materials, from structural decomposition into two adjacent 90° walls.

Phys. Stat. Sol (b) ***151****, 289 (1989)*