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The influence of structure and local structural defects on the magnetic properties of cobalt nanofilms

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Abstract

The present paper considers a mathematical model describing the time evolution of spin states and magnetic properties of a nanomaterial. We present the results of two variants of nanosystem simulations. In the first variant, cobalt with a structure close to the hexagonal close-packed crystal lattice was considered. In the second case, a cobalt nanofilm formed in the previously obtained numerical experiment of multilayer niobium–cobalt nanocomposite deposition was investigated. The sizes of the systems were the same in both cases. For both simulations, after pre-correction in the initial time stages, the value of spin temperature stabilized and tended to the average value. Also, the change in spin temperature occurred near the average value. The system with a real structure had a variable spin temperature compared to that of a system with an ideal structure. In all cases of calculations for cobalt, the ferromagnetic behavior was preserved. Defects in the structure and local arrangement of the atoms cause a deterioration in the magnetic macroscopic parameters, such as a decrease in the magnetization modulus.

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