Domain structures description in cobalt multilayers

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The evolution of magnetization distributions in a wide range of the cobalt layer thicknesses, and in the vicinity of the spin reorientation phase transition (RPT) was described in [1]. A high thickness spin-reorientation phase transition (or the second RPT) was recently found by micromagnetic simulations in cobalt monolayer [2]. The problem of spin reorientation accompanied by changes of a domain structure becomes more complicated in multilayered systems. It is known that in magnetic multilayers with perpendicular anisotropy the saturation field of stripe domains exhibits a non-trivial dependence on the thickness of non-magnetic spacing [3]. In the present work we analyze the domain structures behavior in multilayered systems consisting of magnetostatically coupled cobalt layers separated non-magnetic ones. Our study is focused on the key characteristics of domains structures: the saturation field and domain period as well as thickness-induced spin reorientation in such systems. For magnetic systems with the total magnetic layer thickness, $d<\pi l_c$ (where l_c is the characteristic length of material) we have found a simple analytical formula which connects the domain period and saturation field as a function of the thickness. We analyze the conditions under which the thickness-induced reorientation transition similar to that observed in [4] takes place in our systems.

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