

Remanence Characteristic of Nanostructure of Hard/Soft Magnetic Multilayered Systems

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Abstract: The relation between microscopic properties (e.g., layer thickness, easy axis orientation) and the macroscopic magnetic properties such as remanent magnetization of the ferromagnetic multilayer system is investigated based on a simple micromagnet approach. We concentrate on a multilayer design with periodic boundary condition, where alternating soft/hard layers build a nanostructured multilayer. For any easy axis direction in the soft and hard layers a simple explicit expression of remanence of the system has been derived analytically. We find that the remanence clearly depends on the thickness of the soft magnetic layer and is nearly independent of the thickness of hard magnetic layer. On the other hand, the remanence increases upon reducing the angle enclosed by the saturation magnetization and the easy axis directions of soft magnetic layer. However, it is insensitive to the easy axis direction of hard magnetic layer, but there exists a maximum remanence for a certain easy axis direction of hard magnetic layer.

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