

Magnetization Processes in Single Domain Permalloy Thin Films

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Abstract

Reversible and irreversible magnetization processes in single domain elliptical permalloy thin films are studied by the micromagnetic simulation method. The time-integration of the Landau-Lifshitz-Gilbert type is applied to conduct the 3-dimensional micromagnetic simulation. The magnetization of single domain elliptical permalloy thin films along the hard magnetization axis can yield reversible magnetization curves without hysteresis, and the curves are almost of the linear shape as similar to the magnetization curves of single domain elliptical particles. In the irreversible magnetization process with hysteresis, the switching magnetic fields of elliptical thin films decreases regardless of the grain size and the aspect ratio than the values that are predicted by the Stoner-Wohlfarth model. The results are discussed with respect to the formation of vortices.