Stability of isolated magnetic Skyrmion in Co-Pt thin films by computation simulation.


Universidade Federal de Juiz de Fora

Nowadays, the search for more efficient methods of recording in electronic devices is an important issue in order to maintain the constant technological evolution. Researches in the field of magnetic materials has been developed over the last years and a promissory candidate for substitute the usual methods of storage data are the skyrmions.

Skyrmions are nanometrical quasiparticles which can be pinned in magnetic materials that must exhibit Dzyaloshinskii-Moriya interaction (DM). This kind of interaction is induced by a lack of inversion symmetry of the compound and a strong spin-orbit coupling. After its insertion into the magnetic materials, skyrmions can be moved out over the surface by applying a low scale current. In this work we studied the skyrmion dynamics in cobalt-platinum thin films, specially Néel-type skyrmions. Is remarkable that in this study we are specifically working with interfacial DM interactions which permits generate isolated skyrmions over the material surface. We perform a computational simulation of temporal magnetization evolution using a Fortran F-90 software routine developed by Grupo de Física da Matéria Condensada from the Universidade Federal de Juiz de Fora (GFMC - UFJF) and it is based on micromagnetical model ruled by Landau-Lifshitz-Gilbert equation. Our simulation consists to fix skyrmions in thin films of Co-Pt varying parameters as skyrmion center position, skyrmion radius and thin film length to study the stability of the skyrmion structure.

Our goal in to comprehend the skyrmion behavior is in the near future create and manipulate skyrmions in magnetic materials as a more efficient and reliable method for data controlling in electronic devices.

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