

Abstract Submitted  
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**Magnetoresistance in magnetic nanostructures: the role of nonuniform current**<sup>1</sup> TATIANA RAPPOPORT, Universidade Federal do Rio de Janeiro, TIAGO MACHADO, Centro Brasileiro de Pesquisas Físicas, MARCIO DE MENEZES, Universidade Federal Fluminense, LUIZ SAMPAIO, Centro Brasileiro de Pesquisas Físicas — We developed a method to calculate the magnetoresistance of metallic magnetic nanostructures that takes into account the nonuniform magnetization and an additional ingredient: a non-uniform electric current. We discretize the nanostructure and use the Landau-Lifshitz-Gilbert equation to numerically determine its magnetic structure. Each cell contributes with a local anisotropic magnetoresistance that depends on the relative orientation between the local magnetization and the current. We then obtain a resistance network where the current distribution is calculated using a relaxation method. As a first example, we considered a disk of Permalloy with dimensions that lead to the appearance of a magnetic vortex. We calculated the resistance and current distribution as a function of an in-plane magnetic field and during the dynamical vortex core reversal. We show that the current is concentrated in the vortex core and the resistance curves can be used to observe the vortex core inversion.

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