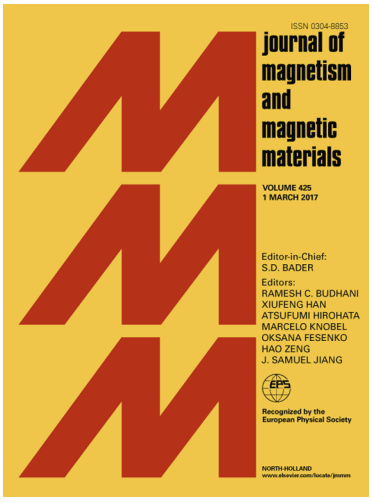

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Shape dependent resonant modes of skyrmions in magnetic nanodisks

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Abstract

Resonant modes of a single Néel type skyrmion in confined nanodisks with varying aspect ratios (AR) are investigated using micromagnetic simulations. The AR of the skyrmion has a non-linear dependence on that of the nanodisk. The power spectra of skyrmions in nanodisks with AR ranging from 1.0 - 2.0 are calculated. With the increase of disk AR, multiple new modes emerge in the power spectrum, which originate from the broken rotational symmetry of both the nanodisk and the skyrmion. All of the spin wave modes are resolved by spatial maps of the real time magnetization fluctuations. New mixed modes such as rotation modes and oscillation modes with different azimuthal and radial components are identified in the elliptical nanodisk with AR=1.8. The new emergent modes may provide new approaches to skyrmion-based oscillators and spin wave sources in confined structures.

Keywords: skyrmion

1. Introduction

Magnetic soliton based spintronic devices, such as domain wall racetrack memories [1] and vortex spin torque oscillators [2], are promising candidates for

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