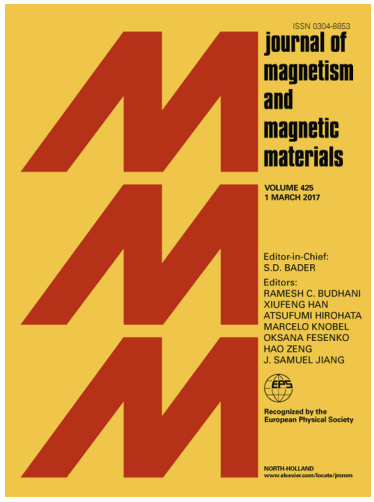

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PII: S0304-8853(16)32526-4
DOI: http://dx.doi.org/10.1016/j.jmmm.2017.03.019
Reference: MAGMA 62540

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 9 October 2016
Revised Date: 20 January 2017
Accepted Date: 10 March 2017

Please cite this article as: Z-x. Li, Y-f. Chen, Z-w. Zhou, Y-z. Nie, Q-l. Xia, D-w. Wang, G-h. Guo, Creation of skyrmion through resonance excitation, *Journal of Magnetism and Magnetic Materials* (2017), doi: http://dx.doi.org/10.1016/j.jmmm.2017.03.019

Creation of skyrmion through resonance excitation

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Abstract: Controllable creation of magnetic skyrmions in nanostructures is a prerequisite for the application of skyrmions in spintronics. Here, we propose a new method for the creation of skyrmions. We show by using micromagnetic simulations that the skyrmions can be nucleated by resonantly exciting one of the skyrmion intrinsic oscillation modes. We first studied the dynamics of skyrmion in a ferromagnetic nanodisk with perpendicular anisotropy. One breathing mode and two non-degenerate gyrotropic modes are identified. Then we applied a circular-polarized microwave field to excite the uniformly magnetized nanodisk. When the frequency of the driving field is equal to the eigenfrequency of the skyrmion gyrotropic mode, stable skyrmions can be created from the initial uniform state. The number of skyrmions can be effectively controlled by appropriately choosing the duration of the driving field or tuning the field amplitude.

Keywords: skyrmion; magnetic dynamics; micromagnetic simulation

PACS: 75.40.Gb; 75.40.Mg; 75.70.Kw

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