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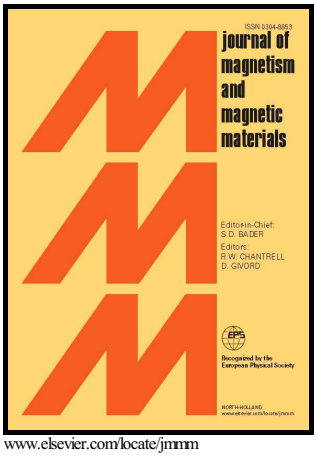

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Influence of temperature on current-induced domain wall motion and its Walker breakdown

Lvchao Fan, Jingguo Hu[1], Yuanchang Su[2] and Jinrong Zhu

College of Physics Science and Technology, Yangzhou University, Yangzhou 225002, People's Republic of China

Abstract

The current-driven domain wall propagation along a thin ferromagnetic strip with thermal field is studied by means of micromagnetic simulations. The results show that the velocity of domain wall is almost independent of temperature until Walker breakdown happened. However the thermal field can suppress Walker breakdown and makes domain wall move faster. Further analysis indicates that the thermal field tends to keep the out-of-plane magnetic moment of the domain wall stay in high value, which can promote domain wall motion and suppress the Walker breakdown by breaking the period of domain wall transformation.

Keywords: domain wall motion, current, temperature, micromagnetic simulation

1. Introduction

Current-induced domain wall (DW) dynamics along ferromagnetic nanostrip is nowadays the focus of much research, as it encompasses fundamental physics and promising novel applications [1-3]. Under the sole function of a current, the DW may be moved along the wire, it has confirmed by several experiments and Numerical Simulation [4-6]. But these applications require two primary problems be solved. Firstly, the threshold current for DW motion is too large. Experiment and micromagnetic simulation has indicated that the DW motion

[1]Tel: 86-0514-87970587, E-mail address: jghu@yzu.edu.cn
[2]Tel: 86-0514-87975466, E-mail address: ycsu@yzu.edu.cn