ELECTRICAL RECTIFICATION EFFECT IN SINGLE DOMAIN MAGNETIC MICROSTRIPS: A MICROMAGNETICS-BASED ANALYSIS

A. Thiaville[1], Y. Nakatani[2]
[1] *Laboratoire de Physique des Solides, CNRS, Univ. Paris-sud, 91405 Orsay Cedex, France*
[2] *Department of Computer Science, University of Electrocommunications, Chofu, Tokyo 182-8585, Japan*

Upon passing an a.c. electrical current along magnetic micro- or nanostrips, the measurement of a d.c. voltage that depends sensitively on current frequency and applied field has been recently reported [1]. It was attributed to the excitation of spin waves by the spin transfer torque, leading to a time-varying anisotropic magnetoresistance and, by mixing of a.c. current and resistance, to a d.c. voltage. We have performed a quantitative analysis by micromagnetics, including the spin transfer torque terms considered usually, of this situation.The signals found from the spin transfer torque effect are several orders of magnitude below the experimental values, even if a static inhomogeneity of magnetization (the so-called ripple) is taken into account. On the other hand, the presence of a small non-zero average Oersted field is shown to be consistent with the full set of experimental results, both qualitatively and quantitatively. We examine, quantitatively, several sources for this average field and point to the contacts to the sample as a likely origin.

[1] A. Yamaguchi, H. Miyajima, T. Ono, Y. Suzuki, S. Yuasa, A. Tulapurkar, Y. Nakatani, *Appl. Phys. Lett*. **90**, 182507 (2007).