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Mirror symmetry in magnetization reversal and coexistence of positive and negative exchange bias in Ni/FeF_2 heterostructures XAVIER BATLLE, M. KOVYLINA, A. LABARTA, Dept. Fisica Fonamental, Universitat de Barcelona, 08028 Barcelona, Catalonia, Spain, R. MORALES, Basque Foundation for Science, IKERBASQUE, 48011 Bilbao, Spain, M. EREKHINSKY, IVAN K. SCHULLER, Physics Department, University of California San Diego, La Jolla 92093 CA, USA — Positively and negatively exchange biased (PEB and NEB) magnetoresistance (MR) loops in Ni/FeF_2 ferromagnetic/antiferromagnetic (AF) heterostructures proceed through exactly the same reversal mechanisms. The MR curves exhibit striking mirror symmetry: the increasing (decreasing) field branch of the PEB (NEB) loop is identical to the decreasing (increasing) branch of the NEB (PEB) loop. The latter suggests that, on average, similar but opposite sign EB domain configurations are reached for low or high cooling fields, with equal interfacial density of pinned uncompensated AF spins responsible for NEB or PEB. Micromagnetic simulations are in agreement with experimental results and imply the coexistence of EB domains of opposite sign for all cooling fields, which results in a new reversal mechanism not previously reported. The persistence of NEB (PEB) domains even at high (low) cooling fields may be produced by the size distribution and density of pinned uncompensated moments in the bulk of the AF. The support of the Spanish MICINN, Catalan DURSI, IKERBASQUE and the US Department of Energy are recognized.

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