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Direct imaging of complex domain walls and chirality sensors in magnetic nanostripes S.R. BOWDEN, J. UNGURIS, Center for Nanoscale Science and Technology, National Institute of Standards and Technology, Gaithersburg, MD 20899, Y. JANG[1], M. MASCARO, C.A. ROSS, Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge MA 02139 — Domain walls (DWs) in patterned ferromagnetic nanostripes are increasingly being considered for non-volatile and radiation hard data storage and logic applications. We use scanning electron microscopy with polarization analysis (SEMPA) to image the formation of complex domain walls in nanostripes and local patterned structures used for sensing DW chirality. The DWs studied have a transverse orientation, where the in-plane spin direction of a 180 $^\circ$ DW is perpendicular to the nanostripe axis. We demonstrate a technique where two 180 $^\circ$ DWs of alternating chirality may interact to form a stable DW with 360 $^\circ$ rotation as opposed to DW annihilation. Higher order DWs with nπ rotation are demonstrated, where n is an integer number of interacting 180 $^\circ$ DWs. The detection of moving 180 $^\circ$ DWs via external fields is studied by placing patterned magnetic triangular elements above and below the nanostripe in-plane. As the DW propagates across the wire, the stray field interacts and switches the magnetization of the triangles. The chirality of the DW may be sensed by designing the triangles to respond to the inherent asymmetry of the DW's stray field.

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