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SEMPA measurements of trapped domain walls in thin film nanoconstrictions. W. CASEY UHLIG, JOHN UNGURIS, Electron Physics Group, National Institute of Standards and Technology, Gaithersburg, MD, 20899-8412 — We used scanning electron microscopy with polarization analysis (SEMPA) to image the magnetic nanostructure of domain walls trapped in patterned NiFe thin film nanoconstrictions. Currents were applied to the structures to induce spin torque driven motion of the domain wall in the nanoconstriction. Various film geometries were investigated in order to understand how the size and shape of the constriction affects the magnetic nanostructure of the domain wall. The structures were fabricated using electron beam lithography. Constriction widths varied from 40 nm to 200 nm. The non-invasive nature of SEMPA allowed successful imaging of the unperturbed, remanent state of the trapped domain walls. In 10 nm thick NiFe films, all of the observed trapped walls (within the constriction) were of the transverse type, and the domain wall widths were strongly dependent on both the width of the constriction (approximately equal to the width) as well as the shape of the constriction. Because SEMPA directly measures the magnetization direction, the image data allows meaningful quantitative comparisons to micromagnetic calculations. Simulations with inserted domain walls show good agreement with the behavior of the domain walls observed by SEMPA. Detailed comparisons will be presented. *Work supported in part by the Office of Naval Research

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