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Excitation of magnetization dynamics in patterned thin films using surface acoustic waves A. BARUTH, S. ADENWALLA, University of Nebraska - Lincoln — The investigation of magnetization dynamics often involves the application of magnetic field or light pulses on very short time scales. Here we outline an alternative method that utilizes the changes in magnetic anisotropy associated with magneto-elastic strain. Surface Acoustic Wave (SAW) transducers are readily available at high frequencies (>10GHz), and provide an ideal method for straining thin film magnetic elements. SAWs propagate across a piezoelectric substrate, alternately compressing and expanding the surface with a wavelength and period that depends only on the propagation speed of the piezoelectric and the spacing of the interdigital transducer (IDT) that produces the SAW. Patterning thin film magnetic nanostructures at a spacing identical to the SAW wavelength ensures that all elements will be in phase as the SAW passes through. Passage of the SAW through a magnetic element leads to expansion and compression along the SAW propagation direction dynamically altering the easy axis of magnetization at ultra high frequencies. The subsequent dynamics can be probed using the Kerr effect. Using an IDT of 100 fingers operating at 87.2 MHz with realistic insertion losses, an array of 30nm thick, 10x20μm rectangular Co bars require voltages of $\sim$3.3V to fully switch the magnetization from the easy to hard axis without the application of an external field. Funded by NSF-MRSEC DMR-0820521.

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