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**Current induced resonance of vortex domain wall in permalloy nanowires** RAI MORIYA, LUC THOMAS, MASAMITSU HAYASHI, XIN JIANG, CHARLES RETTNER, STUART S.P. PARKIN, IBM Almaden Research Center — We explore the current induced resonant excitation of magnetic domain walls in permalloy nanowires which have vortex structures. Domain walls (DWs) are injected and pinned at artificial pinning sites or notches patterned by electron beam lithography in nanowires 300 nm wide and 20 nm thick. Ac current excitation of vortex DW has been measured using RF rectification method where ac-current is applied to nanowire by using bias-tee and at the same time dc-voltage difference across the nanowire has been measured with voltmeter. The ac current results in a translational motion of the DW vortex core which accompanies the resistance change of sample due to the anisotropic magnetoresistance effect at the DW. This resistance change gives rise to a small but measurable dc voltage along the nanowire and allows us to detect its resonance. The resonance frequency is very sensitive to external magnetic field applied along the wire. We interpret the resonance to be due to a magnetic field induced motion of the DW within the pinning potential arising from the notch. Using the DW energy profile calculated from micromagnetic simulations and a 1d analytical model we obtain good agreement with the experimentally observed field dependence of the resonant frequency.

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