

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Coherent precession of propagating domain walls in permalloy nanowires** MASAMITSU HAYASHI, LUC THOMAS, CHARLES RETTNER, RAI MORIYA, STUART PARKIN, IBM Alamden Research Center — We report on domain wall (DW) dynamics in permalloy nanowires. We demonstrate the precessional nature of the DW propagation above the Walker breakdown field. Time resolved resistance measurements were performed on 200 nm wide 10 nm thick permalloy nanowires. Oscillations in resistance are observed when the DW propagates along the nanowire. The frequency of this oscillation varies linearly with magnetic field, according to the Larmor precession frequency. By contrast, current passing through the nanowire has relatively little effect on the oscillation frequency even though it is large enough to influence the DW velocity. To explore the origin of this resistance oscillation, dc resistance measurements were performed on permalloy nanowires with a pinning center located along the nanowire. The state of the DW pinned at the pinning center can be inferred from the nanowire's resistance. By using a combination of current and magnetic field, the time at which the DW arrives at the pinning center can be tuned, allowing us to show that the chirality of the domain walls reverses periodically as the wall propagates along the nanowire.

Masamitsu Hayashi  
IBM Alamden Research Center

Date submitted: 03 Dec 2006

Electronic form version 1.4