Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Nonlinear regimes of current-induced domain wall motion YA. B. BAZALIY, M. HAYASHI, B. A. JONES, S. S. P. PARKIN, IBM Almaden Research Center, A. JOURA, Department of Physics, Georgetown University — We study theoretically the current-induced motion of a magnetic domain wall in a nanowire in the presence of external magnetic field and pinning potential. The wall is assumed to be rigid and is described by the one-dimensional model equations [1,2]. Both "adiabatic" and "non-adiabatic" spin-transfer terms are taken into account. The current-induced motion differs significantly below and above the Walker breakdown, i.e., in the regimes when the deflection angle is close to a particular value vs. when it makes the full circles. We find two novel phenomena. The first one is the existence of a stable autogeneration regime for a wall trapped in a shallow pinning center. The second is the "reversed motion window" regime in the situation when current and magnetic field push the domain wall in opposite directions. Both regimes are qualitatively different from the domain wall resonance regime studied in Ref. [1,3], or zero field current induced motion [1,2]. Reversal of the domain wall velocity by a relatively small current above the Walker breakdown was recently achieved in Ref. [4].

1. Gen Tatara and H. Kohno, Phys. Rev. Lett. **92**, 086601 (2004).
2. A. Thiaville *et al.*, Europhys. Lett., **69**, 990 (2005).
3. E. Saitoh *et al.*, Nature, **432**, 203 (2004).
4. M. Hayashi *et al.*, submitted (2005).

Ya. B. Bazaliy
IBM Almaden Research Center

Date submitted: 29 Nov 2005 Electronic form version 1.4