

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Damping in Ferromagnets: Landau-Lifshitz versus Gilbert¹

WAYNE M. SASLOW, Texas A&M University, College Station TX 77843-4242, MARK D. STILES, NIST, Gaithersburg, MD 20899-8412, ANDREW ZANGWILL, School of Physics and Astronomy, Georgia Institute of Technology, Atlanta, GA 30332-0430 — We first note a number of qualitative and quantitative arguments favoring Landau-Lifshitz over Gilbert damping in ferromagnets. We then explicitly demonstrate a classical Fokker-Planck-like derivation of the macroscopic damping rate in terms of thermodynamic fluctuations (fluctuation-dissipation). Because out-of-equilibrium fluctuations are driven toward equilibrium by their excess thermodynamic energy, the damping term is proportional to the transverse component of the effective field, thus yielding Landau-Lifshitz damping with an explicit expression for the damping coefficient. This damping is unaffected to lowest order in systems with spin transfer torque (STT). Recent experiments on current-driven domain wall motion have a natural interpretation in terms of the so-called adiabatic STT.

¹Supported by DOE grants DE-FG02-06ER46278 and DE-FG02-06ER46278

Wayne M. Saslow
Texas A&M University

Date submitted: 02 Dec 2006

Electronic form version 1.4