Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Relaxation of the magnetization in biaxial superparamagnetic particles in the presence of a strong uniform magnetic field Y. KALMYKOV, MEPS, Université de Perpignan, 52 Avenue Paul Alduy, 66860 Perpignan, France, W. COFFEY, Dept. Electronic & Electrical Engr., Trinity College, Dublin, Ireland, B. OUARI, MEPS, Université de Perpignan, 52 Av. Paul Alduy, 66860 Perpignan, France, S. TITOV, Inst. of Radio Eng. & Electronics, Russian Acad. Sci., Fryazino, 141190, Russia — The longitudinal relaxation time of the magnetization and the spectrum of the complex magnetic susceptibility are evaluated for biaxial single domain ferromagnetic particles in the presence of a strong uniform magnetic field. The relaxation time is estimated for all dissipation regimes, i.e., very low damping, intermediate-to-high damping, and turnover, using the method of Coffey *et al.* [Adv. Chem. Phys. **117**, 483 (2001)]. It is shown that the simple asymptotic formulae for the greatest relaxation time so obtained are in complete agreement with the relaxation time calculated from the infinite hierarchy of linear differential-recurrence equations for the statistical moments. This hierarchy, which governs the relaxation of the magnetization of an individual particle, is derived by averaging the governing stochastic Gilbert equation over its realizations. The exact solution of the system of moment equations is obtained by matrix continued fractions. Simple analytic equations, which allow one to accurately predict the spectrum of the longitudinal complex susceptibility for wide ranges of the barrier height and dissipation parameters, are also proposed.

Yuri Kalmykov
MEPS, Université de Perpignan, 52 Avenue Paul Alduy,
66860 Perpignan, France

Date submitted: 28 Nov 2005 Electronic form version 1.4