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Micromagnetic investigations of spatial fluctuations of the first order perpendicular anisotropy in thin films SERGEI WALLACE, ANDREW TUGGLE, MATTHIAS BUCHMEIER, CLAUDIA MEWES, TIM MEWES, The University of Alabama - Tuscaloosa — We report on micromagnetic investigations of spatial fluctuations of the first order perpendicular anisotropy constant K1 in thin films and their influence on the effective anisotropy constant for these materials. In particular we show that spatial fluctuations of K1 on a sufficiently small length scale lead to a second order anisotropy constant K2. Such a second order perpendicular anisotropy constant is frequently assumed in the literature based on a phenomenological approach, without a model for its physical origin. Based on arguments similar to Slonczewski's for explaining the biquadratic exchange coupling (Phys. Rev. Lett. **67**, 3127 (1991)) one expects that fluctuations of K1 will lead to a significant K2. In the limit of small-scale fluctuations one expects this fluctuation induced K2 to scale with the square of the magnitude of the first order anisotropy fluctuations ΔK1 and the square of the characteristic length scale L of the fluctuations (JMMM **236**, 339 (2001)). The sign of the induced K2 is such that it can lead to an 'easy cone' magnetization. In addition to investigations of the quasi-static properties we will also discuss how the spatial fluctuations influence the dynamic properties of thin films.

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