Predicting stability and switching rates using energy landscape methods

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There has been a large amount of recent interest in systems with inhomogeneous anisotropy (exchange coupled media, graded media) for high-density recording. The usefulness of these materials depends critically on stability -- we need to be able to calculate spontaneous switching rate . This was done in 1960 by Brown for for coherently-switching systems. We have extended this method to incoherent systems (such as ECM or graded media, which switch by domain wall motion) using an energy-landscape approach. We have shown that the 1D energy landscape used for coherent systems is **not** sufficient for systems that switch by domain wall motion, but that these systems can be well described by 2D landscapes. We have developed efficient and accurate algorithms for computing the landscape, by which we mean a constrained-minimum energy. For fixed values of two order parameters (such as the dipole and quadrupole moment) we minimize the energy with respect to all other variables, such as short wavelength spin waves.