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Stochastic simulations of switching error in magneto elastic and spin-Hall effect based switching of nanomagnetic devices¹ MD MAMUN AL-RASHID, SUPRIYO BANDYOPADHYAY, JAYASIMHA ATULASIMHA, Virginia Commonwealth University — Switching of single domain multiferroic nanomagnets with electrically generated mechanical strain [1] and with spin torque due to spin current generated via the giant spin Hall effect [2] are two promising energy-efficient methods to switch nanomagnets in magnetic computing devices. However, switching of nanomagnets is always error-prone at room temperature owing to the effect of thermal noise. In this work, we model the strain-based and spin-Hall-effect-based switching of nanomagnetic devices using stochastic Landau-Lifshitz-Gilbert (LLG) equation and present a quantitative comparison in terms of switching time, reliability and energy dissipation.

[1] J. Atulasimha, & S. Bandyopadhyay, Applied Physics Letters, 97(17), 173105, 2010.

[2] L. Liu, C. F. Pai, Y. Li, H.W. Tseng, D. C. Ralph, & R. A. Buhrman Science, 336(6081), 555-558, 2012.

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