

Abstract Submitted
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Spin transfer torque switching in MTJ arrays with nanoengineered uniaxial anisotropy¹ ILYAS A. H. FARHAT, Khalifa University, AMS Dept. and KSRC, Abu Dhabi, UAE, E. GALE, University of Bath, UK, M. ABI JAOUDE, A. F. ISAKOVIC, Khalifa University, AMS Dept. and KSRC, Abu Dhabi, UAE — Enhancing Magnetic Tunnel Junction (MTJ) energy efficiency is the key to embed it in low power applications. We report a detailed study on the behavior of the analytical expression of switching current density as a function of geometrical and magnetic parameters, for both I-MTJs and P-MTJs. Our study shows that the current model requires some modifications to improve the match between the model and the experiment. We also show under which criteria a scaledown of MTJ devices can help in reduction of current density. We then used the device model of MTJ to study the power performance of MTJ device, proposing a roadmap to lower switching power of the device. Comparisons between ours and data for similar devices in literature, combined with the above analysis, suggests the need for qualitatively different model, and for this purpose, we explored the variations of the effective energy density model [1], which may explain the device behavior better. [1] T. Taniguchi et al., Phys. Rev. B 87, 054406 (2013).

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