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Exchange assisted spin transfer torque switching XI CHEN, Physics Department, University of Minnesota, RANDALL VICTORA, Electrical Engineering Dapartment, University of Minnesota — The main challenge in the application of spin transfer torque switching is the high current required to reverse the magnetization. We propose a composite structure containing soft and hard magnetic layers that significantly lowered the switching current. The dynamic phase diagram of the structure is studied using a macrospin model, with Landau-Lifshitz-Gilbert equation including a spin torque term. It is shown that an optimal exchange coupling strength exists with a value around half the anisotropy of the hard layer. By using multiple soft layers with graded anisotropy, a further reduction can be achieved. We also show that the switching current grows linearly with the damping constant in the soft layer. This means that a low damping, soft material can facilitate the reversal of the hard layer and reduce the switching current by over an order of magnitude.

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