

# Exchange bias for a ferromagnetic film coupled to a spin glass

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For a model system consisting of a ferromagnetic layer coupled to a spin glass extensive Monte Carlo simulations are performed. The spin glass is modeled as Ising system with a nearest neighbor interaction which is Gaussian distributed with zero mean. Its coupling to the ferromagnetic layer is assumed to be either random or ferromagnetic. Exchange bias and all phenomena associated with typical exchange bias systems are observed as a result of a frozen spin glass state.

A main result of our calculations is that the strength of the bias field decreases with increasing strength of the cooling field in qualitative agreement with recent experiments. This is in remarkable contrast to the conventional ferromagnetic/antiferromagnetic systems where the opposite behavior is found. We also found that for small cooling fields the bias field is much stronger for a random exchange interaction across the interface between ferromagnet and spin glass as compared to a ferromagnetic interaction. Both effects have the same origin, namely a stronger susceptibility of the spin glass to a random rather than to a homogeneous field. The coercivity decreases with increasing temperature roughly in a linear way having around the spin glass freezing temperature still about half of its zero temperature value.

9.7 cm

13.4 cm

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