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Low-Frequency Magnetization Noise in Spin-Valve Structures[1]
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— We report on 1/f resistance noise due to thermally driven fluctuations of the domain structure in GMR and MTJ sensors. Resistance noise from both the free layer (FL) and reference layer (RL) is evident. A near linear scaling of the normalized noise power with the sensor's sensitivity is observed. For a given sensitivity, the RL exhibits higher noise than the FL. This appears correlated to the larger imaginary (dissipative) component in the resistance susceptibility of the RL. In addition, we find that the imaginary component is larger for layers that exhibit pronounced magnetic hysteresis, suggestive of connection between the noise and hysteresis. A model based on equilibrium magnetization fluctuations is in good quantitative agreement with the measured noise power over most of the sensor's magnetoresistive response. A magnetic 1/f noise parameter is defined which can be used to compare magnetoresistive sensors having differing sizes, sensitivities, and under different biasing conditions.

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