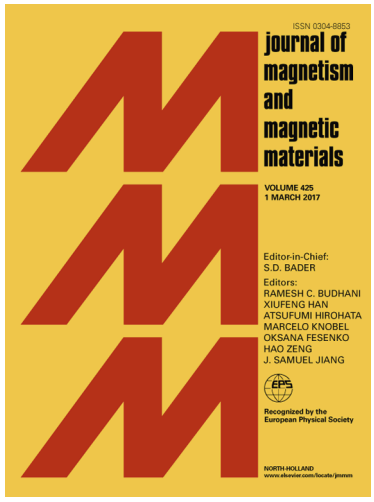

Research articles

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Detection of magnetic moment in thin films with a home-made vibrating sample magnetometer

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Abstract

This paper explores the optimization of an array of pick-up coils in a home-made vibrating sample magnetometer for the detection of magnetic moment in thin films. Sensitivity function of a 4-coils Mallinson configuration was numerically studied for the determination of the physical dimensions that enhance the sensitivity of the magnetometer. By performing numerical simulations using the Biot-Savart law combined with the principle of reciprocity we were able to determine the maximum values of sensitivity and the influence of the separation of the coils on the sensitivity function. After the optimization of the pick-up coils, the vibrating sample magnetometer was able to detect the magnetic moment of a 100 nm-thickness $Fe_{19}Ni_{81}$ magnetic thin film along and perpendicular to the in-plane anisotropy easy axis. The implemented vibrating sample magnetometer is able to detect changes in the magnetic moment of $\sim 2 \times 10^{-4}$ emu.

Keywords: Vibrating sample magnetometer, magnetometry, principle of reciprocity, Sensitivity function, magnetic thin films.

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