A room-temperature alternating current susceptometer—
Data analysis, calibration, and test

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An AC susceptometer operating in the range of 10 Hz to 100 kHz and at room temperature is designed, built, calibrated, and used to characterize the magnetic behaviour of coated magnetic nanoparticles. Other weakly magnetic materials (in amounts of some millilitres) can be analyzed as well. The setup makes use of a digital acquisition system in order to determine the amplitude and the phase of the sample magnetization as a function of the frequency of the driving magnetic field, which is powered by a digital waveform generator. A specific acquisition strategy makes the response directly proportional to the sample susceptibility, taking advantage of the differential nature of the coil assembly. A calibration method based on conductive samples is developed. © 2013 AIP Publishing LLC. [http://dx.doi.org/10.1063/1.4842255]