Magnetic characterisation of ferromagnetic material

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In magnetic and electromagnetic non destructive testing the physical properties of the material are often not well known or completely unknown. The design of the non destructive testing systems that provide the magnetisation is often oversized in order to get enough magnetic saturation (e.g. in magnetic flux leakage method or in magnetoscopy method). An improvement of the device performances, expressed usually by the signal to noise ratio, can be obtained only when the designer of the device well know the material characteristic in terms of magnetic curve, the curve that links the magnetic field strengths to the magnetic flux density. A good device has to be able to saturate the material sample under test but not to overcame determinate values. In fact, when the magnetisation is low, the leakage of the flux is negligible, while when the magnetisation is too strong the material tends to be like air and the leakage flux is negligible too. The experimental characterisation is derived from the technique adopted for the testing of soft magnetic material adopted in electrical machines or electromechanical actuators. In the present paper will be presented some material characterisation useful for the non destructive testing of railway track, metallic ropes or reinforcement iron.