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Isothermal magnetisation curves measured with a coercivity spectrometer

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The coercivity spectrometer constructed at Kazan University consists mainly of a rotating non-magnetic disk spinning with a frequency of 22 Hz which passes the sample to be measured through two induction coils during each turn. One coil is placed on the pole tips of an electromagnet to measure induced magnetisation, while remanence is measured a three-fourth turn later in a second μ-metal shielded induction coil. After completing a full turn, the next field step is applied. Having reaching maximum values, the field strength is reduced to zero and then incremented in the opposite direction up to the maximum. Finally, high field remanence stability is monitored for about 100 s. High resolution curves of initial magnetisation, descending hysteresis branch, isothermal remanent magnetisation acquisition, backfield remanence and short-term remanence decay can be expeditiously measured.

The coercivity spectrometer provides standard hysteresis parameters such as coercive force, coercivity of remanence, saturation magnetisation, saturation remanence and magnetic high-field susceptibility. The advantage over other hysteresis measuring devices such as for instance vibrating sample and alternating gradient field magnetometers or variable field translation balances is besides short-measurement time and low price, the high measurement resolution allowing more sophisticated data interpretation like coercivity spectra analysis. The other advantage is the instantaneous measurement of induced and remanent magnetisation which can be used for separation of transient and remanent magnetisation contributions and the study of magnetostatic interactions applying the principles of the Preisach-Néel theory.

We will present measurement results of artificial (e.g. ferrofluid, magnetic tape) and natural (e.g. Tiva Canyon tuff, lavas, baked clay) samples and interpret and discuss them in terms of the Preisach-Néel theory (*cf.* Fabian & von Dobeneck 1997) demonstrating the great potential of the coercivity spectrometer for environmental magnetic investigations.

Fabian, K. & von Dobeneck, T. 1997. Isothermal magnetization of samples with stable Preisach functions: A survey of hysteresis, remanence and rock magnetic parameters, *Journal of Geophysical Research*, 102, 17659 – 17677.