MM VFTB SOLENOID at Dr. Maria Cioppa's laboratory, University of Windsor, Canada

Petersen Instruments

Advanced Variable Field Translation Balance

Multi Purpose High Sensitivity Magnetometer For Research And Industry Applications

Advanced Variable Field Translation Balance Product Description

The Advanced Variable Field Translation Balance (AVFTB) is a multi purpose high sensitivity magnetometer for research and industry applications. It is particularly designed for measurements of large size samples. The instrument combines the measurements of hysteresis loops / FORC diagrams, IRM aquisition, remanence coercivity and thermomagnetic curves. As a new feature (thus the Advanced in AVFTB) the instrument allows the simultaneous measurement of MAGNETIZATION and SUSCEPTIBILITY of a sample. The AVFTB is offered in two types, the SOLENOID version and the ELECTROMAGNET version:

The AVFTB SOLENOID operates with both DC magnetic fields and AF magnetic fields. So it additionally allows you to do AF demagnetization as well as ARM aquisition. All measurements can be performed at any temperature between room temperature and 800°C.

The AVFTB ELECTROMAGNET has a strong maximum magneization field (up to 12 kOe = 1.2 T). Also it can additionally do low temperature measurements down to -180 °C (liquid nitrogen temperature). The AVFTB ELECTROMAGNET is not equipped with an AF demagnetization unit.

Data aquisition and analysis software and a MS Windows PC for controlling the instrument are included with both versions of the AVFTB.

Features Overview:

Range and sensitivity:

Type:	SOLENOID	ELECTROMAGNET	Units
Measurement range (mag. moment):	10E-6 to 10	10E-5 to 10	emu
Measurement range (magnetization):	10E-6 to 10	10E-5 to 10	emu / g
Maximum sample weight:	2.0	0.5	g
Maximum sample size:	1000	200	mm^3
Maximum magnetization field:	3.2	12	kOe
Maximum demagnetization field:	1.2	n/a	kOe
Temperature range:	Room to 800	-180 to 800	°C

Measurement modes:

(Extended) Hysteresis Loops / FORC Diagrams
IRM Curves
Coercivity Measurements
Temperature Ramps (Curie Temp.)
Demagnetization Curves (AVFTB SOLENOID only)
ARM Curves (AVFTB SOLENOID only)

With both types of AVFTB all measurements can be performed simultaneously aquiring both MAGNETIZATION and SUSCEPTIBILITY of a sample!

Principle Of Operation

The Advanced Variable Field Translation Balance (AVFTB) is a modification of the horizontal magnetic translation balance. In contrast to the normal horizontal translation balance in the AVFTB the magnetic gradient is not produced by the special shape of the pole pieces of the electromagnet, but by a separate set of gradient coils. The generated gradient field is not kept constant, but is oscillating with a certain frequency.

The AVFTB can thus be considered a one-dimensional harmonic oscillator with damping, operated in forced oscillation mode. The oscillating part of the instrument is a pendulum with bifilar suspension with the sample fixed to it. The motion of the system is excited by a periodic force acting on the sample and generated by the gradient coils.

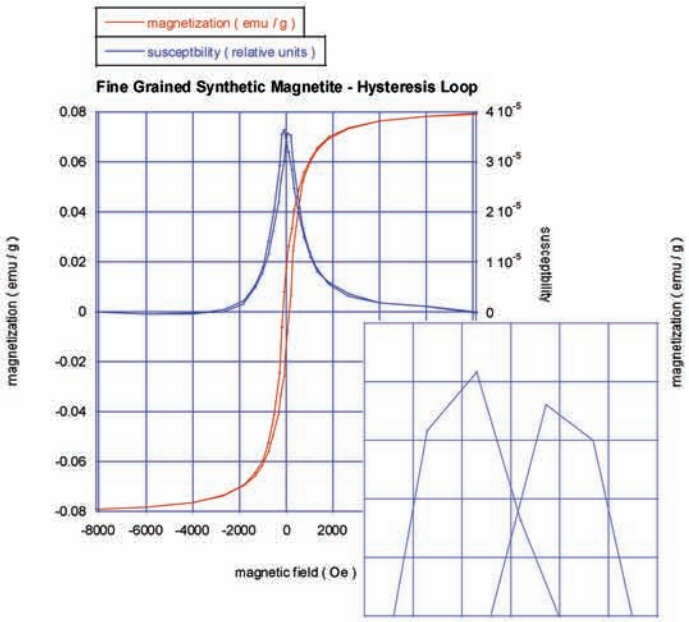
The system is operated at resonance frequency to obtain highest sensitivity. The motion of the sample is monitored by a linear voltage detector (LVDT). This signal – after processing in the PC – is then proportional to the magnetic moment of the sample. The Advanced VFTB introduces a special mode of operation that allows the user to simulataneously measure the magnetic susceptibility.

MM VFTB ELECTROMAGNET Dr. Zhang Weiguo's Environmental Magnetism Laboratory, East China Normal University, Shanghai, China

MM VFTB ELECTROMAGNET at Dr. Emilio Herrero-Bervera's laboratory, Institute of Geophysics and Planetology, University Of Honolulu, Hawaii, USA

Advanced Variable Field Translation Balance Sample Output

The AVFTB offers various methods for magnetic characterization of material samples. Magnetization (M) and magnetic susceptibility (S) can be simultaneously measured in relation to temperature or magnetic field (H). Examples of Hysteresis Loops, a Thermomagnetic Ramp and a Backfield Curve for different materials are shown here as overlays of red (magnetization) and blue (susceptibility) graphs.



Closeup of upper part of the susceptibility curve: Branch with greater amplitde resembles downwards curve, branch with lower amplitude is upwards curve.