Construct, Conduct & Comprehend Physics Experiments

LEAI-75 Apparatus of Magnetoresistance & Giant Magnetoresistance Effect

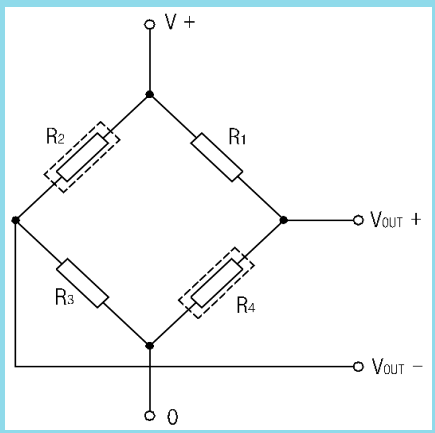
- *Compact design*
- *Ample experimental examples*
- *Affordable*

The resistance change of a material induced by a magnetic field is called the magnetoresistive effect, which includes normal magnetoresistance (OMR), anisotropic magnetoresistance (AMR), giant magnetoresistance effect (GMR), colossal magnetoresistance (CMR), tunneling magnetoresistance (TMR), etc.

This instrument provides three kinds of magneto-resistance sensors, a multilayer membrane GMR sensor, a spin valve GMR sensor, and an anisotropic magneto-resistance sensor. It helps students understand the principles and applications of different magneto-resistance effects, and is suitable for fundamental physics experiments as well as modern physics experiments at universities.

Experimental contents of this apparatus include:

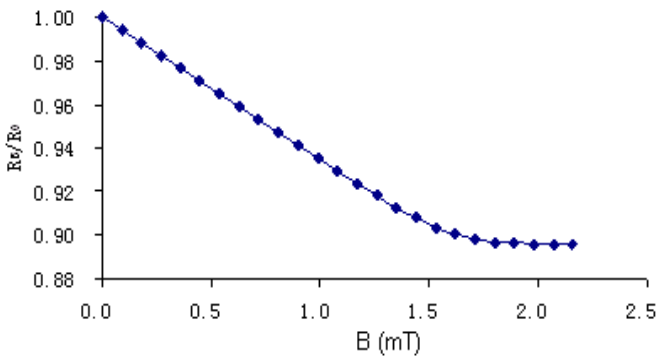
1. Understand magneto-resistance effects and measure the magnetic resistance *R*b of three different materials.
2. Plot diagram of *R*b/*R*0 with *B* and find the max value of resistance relative change (*R*b-*R*0)/*R*0.
3. Learn to calibrate magneto-resistance sensor & calculate the sensitivity of three magneto-resistance sensors.
4. Measure the output voltage and the current of three magneto-resistance sensors.
5. Plot the magnetic hysteresis loop of a spin-valve GMR.



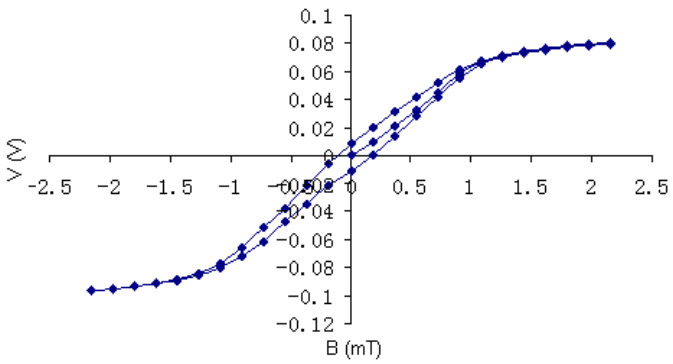
Wheatstone bridge circuit of GMR sensor

Parts & Specifications

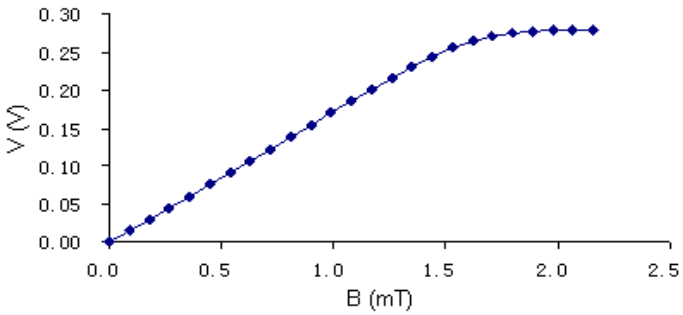
Multilayer GMR sensor	linear range: 0.15~1.05mT; sensitivity: 30.0~42.0 mV/V/mT
Spin valve GMR sensor	linear range: -0.81~0.87mT; sensitivity: 13.0~16.0 mV/V/mT
Anisotropic magnetoresistance sensor	linear range: -0.6 ~ 0.6 mT; sensitivity: 8.0 ~ 12.0 mV/V/mT
Helmholtz coil	number of turns: 200 per coil; radius: 100 mm
Helmholtz coil constant current source	0 - 1.2 A adjustable
Measurement constant current source	0 - 5 A adjustable



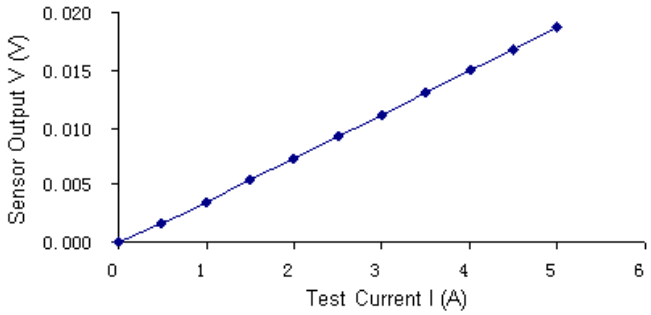
Relationship between R_B/R_0 and B of the multilayer GMR



Relationship between V and B of the spin valve GMR sensor



Relationship between V and B of the multilayer GMR sensor



Relationship between V and I of the multilayer GMR sensor

Note: above product information is subject to change without notice.

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