

Flux-gate Magnetometer Using a Sound Card in a Personal Computer

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Many students have had some experiences of playing with magnets in child age. Such experiences should be developed to introduce their interests to geophysics and geohistory because the behaviors of a compass and the collected iron sand have a close relation to geo- and rock-magnetism. However, the high-sensitive magnetometer, which enables us to measure the geomagnetic field and rock magnetism, is expensive and hard to use. That is not a toy like 'the magnet' in child age.

I have been developing a flux gate magnetometer in low price using a sound card equipment in a standard personal computer. A quantitative magnetic measurement will become possible costing less than a few thousand yen for the sensor.

Instrumental Elements are as below.

[Flux gate magnetometer]

Flux gate magnetometer is a sensor that reads the static magnetic field in the second harmonic signal of the mutual induced voltage utilizing the magnetic saturation of a ferromagnetic material core. A lock-in amplifier is normally used to detect the amplitude of second harmonic signal.

[Magnetic material]

A ferrite core is used to our sensor. Ferrite cores are produced on a large scale for high-frequency noise filter.

[Personal Computer]

A popular personal computer can play and record sound with an expansion named 'sound card'. A standard sound card has 16-bit 48kHz AD/DA converter. These functions can be used for the developing magnetometer. A long-time data accumulation is easy to realize using the PC.

Some trials for detecting the remnant magnetization of volcanic rocks and the time variation of the geomagnetic field will be shown together with the developed making process of the magnetometer.