

## A Pulsed Field Magnetometer for the Measurement of Small Sized Permanent Magnets

Y.B. Kim<sup>\*1</sup>, H.T. Kim<sup>1</sup>, G.A. Kapustin<sup>1,2</sup>

<sup>1</sup> Korea Research Institute of Standards and Science, Daejeon 305-600, Korea

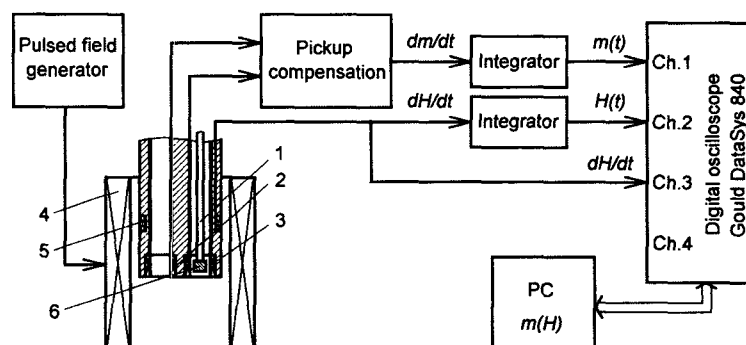
<sup>2</sup> RRC Kurchatov Institute, Moscow 123182, Russia

\*Corresponding author: e-mail: ybkim@kriss.re.kr, Phone: +82 42 868 5161, Fax: +82 42 868 5018

Small and thin magnets are widely used for the small motors of mobile products such as notebook computers, cell phones, digital cameras etc. The small magnets are usually made from machining the large magnets. However, their magnetic properties are changed by mechanical machining<sup>1</sup>, and the direct measurements of small magnets are needed for motor design. Recently, we have constructed a 10-Tesla pulsed field magnetometer (Fig.1) for full hysteresis loop characterization of small sized rare earth magnets. In order to obtain high sensitivity, an induction coil compensated in three orthogonal directions<sup>2</sup> was wound on a bobbin (4 mmID x 5 mmL) made from the mixture of epoxy and Al<sub>2</sub>O<sub>3</sub> powder. The signals induced on the m-coil and H-coil are integrated by analogue integrators, and transferred to a personal computer for data processing. The sensitivity of the magnetometer is  $5 \cdot 10^{-4}$  emu which is enough for the measurement of 1- $\mu$ m thickness NdFeB film magnets. Using the magnetometer we successfully measured the magnetic properties of some diamagnetic materials of the volume susceptibility in order of  $10^{-7}$ . The calibration procedure, sensing coil homogeneity, stability of the magnetometer and hysteresis loops of NdFeB magnets will be discussed.

### References

- [1] H. Nishio, H. Yamamoto, M. Nagakura, and M. Uehara, IEEE Trans. Magn. 26, 257 (1990).



- [2] G.A. Kapustin, Rev. Sci. Instrum. 70, 82 (1999).