AQ06

A Research on the Structure of Permanent Magnets in the Dual Magnetic Float Type Level Gauge

Dong Sok Kim, Jae Man Han, Dug Gun Kim, and Gwan Soo Park*

School of Electrical Engineering, Pusan National University, Busan 609-735, South Korea

*Corresponding author: e-mail: gspark@pusan.ac.kr; optional phone: +82-51-510-2788; optional fax: +81-51-513-0212

For the measurement of liquid level in ship's cargo tank, ballast tank, fuel oil tank and fresh water tank, several types of gauge meter are used such as tubular type, magnetic float type, reflex type transparent type and welding pad type. Among them, magnetic float type gauge meter is environmental friendly device because it is free of power source and maintenance. The main obstacle of the device is relatively large error bound. Mutual influence of magnets cause reed switch to malfunction in the dual magnetic float type gauge to detect a specific level.

In this paper, finite element method is used to design and analysis of the magnetic float type gauge meter. The operation of reed switch according to the magnetic field has been successfully described and agreed well with experimental measurement. We designed the combination of permanent magnet and suitable distance of dual level gauge that reed switch operate exactly. The optimum geometry with combination of permanent magnet and reed switches are designed to achieve 98% accuracy of fluid level.

Fig. 1 is the distribution of magnetic flux density at 4 pole magnetic Float. Fig. 2 is a signal of detection and operation (on-off) of reed switch by senor module at 4-pole Magnetic Float.

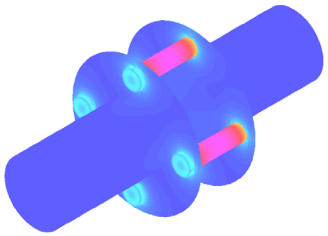

Fig. 1. Distribution of magnetic flux density in Magnetic Float.

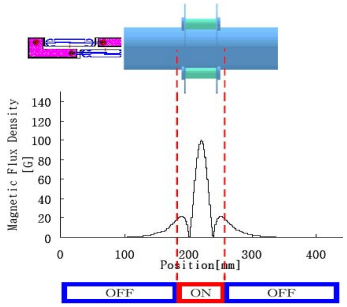

Fig. 2. Detection by sensor module at 4-pole Magnetic Float.

REFERENCES

[1] Gulden P., Vossiek M., Pichler M., "Application of state-space frequency estimation to a 24-GHz FMCW tank level gauging system", Proc. of Fifth World Congress on Intelligent Control and Automaition, 2004.

[2] Kaichun Ren, "The influecne by temperature and product density to accuracy of magnetostrictive level gauge", Proc. of IEEE conference on Information Acquisition, pp. 410-412, 2004.

AQ07

Magnetic Sensor System using Asymmetric Giant Magnetoimpedance Head

Seok Soo Yoon[1], CheolGi Kim[2], Pratap Kollu[2], and Kun Woo Kim[1]*

[1]Department of Physics, Andong National University, Andong 760-749, South Korea

[2]Division of Nano Engineering, Chungnam National University, 220 Gung-dong, Yuseong-gu, Daejeon 305-764, South Korea

*Corresponding author: Seok Soo Yoon, e-mail: yoon@andong.ac.kr

Recently sensitive micro-magnetic sensors are strongly required to grade up technologies for automation, motorization, computerization, and bio-engineering through intelligent measurement and control systems. This paper gives the comprehensive analysis of the Asymmetric Giant MagnetoImpedance (AGMI) sensor's performance with negative feedback. Asymmetrical behaviour of the GMI is required for linear magnetic field sensors as the sensitivity and linearity for magnetic field are the most important parameters in the practical application of GMI to magnetic sensors, and this has been realized by magnetic field annealing in amorphous ribbon. A novel AGMI sensor system was developed and the performance of the system was carefully studied with and without applying negative feedback. The sensor head was 10 mm x 1 mm x 20 μm $Co_{66}Fe_4Si_{15}B_{15}$ ribbon. On applying the negative feedback the sensor shows excellent linearity free from hystereses as shown in Fig.1.

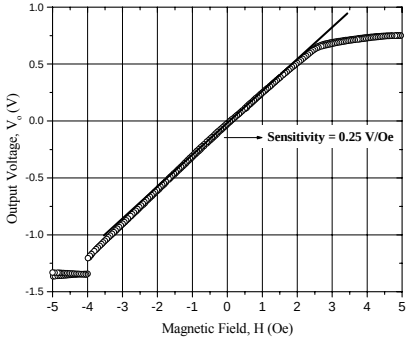

Fig. 1. Characteristic curve of the asymmetric GMI sensor system.