AQ08

Magnetic Shielding Effectiveness Measurement of Magnetic Steel Sheets in ELF Range

Kyoheum Yeon[1], Derac Son[1]*, Eon byeong Park[2], Jae Young Lee[2], Kyung Hwan Do[3], and Jae Seg Park[3]

[1]Department of Physics, Hannam University Ojung-dong 133 Daejeon, Korea
[2]Environment Research Center, RIST Hyoja-dong 32 Pohang. Korea
[3]Cold Rolled Product Technology Team, POSCO Center Daechi-dong 4 Seoul. Korea

*Corresponding author: e-mail: deracson@hnu.kr

Magnetic field shield becomes more important due to the not only EMI/EMC problems but also bad influence to the human body[1.2]. Many countries now

have regulation for magnetic field strength limit in ELF range. Magnetic Shielding Effectiveness (MSE) measuring method for constructions is in ASTM[3], but there is no measuring method for sheet specimen. In this work, we have designed new type of MSE measuring equipment for steel sheet specimens "biowave-steel" which is produced in POSCO. MSE measurement for steel sheet, we invoked two yokes. One is magnetizing yoke and the other is sensing yoke as shown in Fig. 1. And test specimen put into between two yokes. MSE was calculated from induced voltage of sensing yoke with sample V1 and without sample V_2

$$\mathrm{MSE} = \frac{V_2}{V_1} \qquad (1)$$

For higher reproducible measurement, gabs between magnetizing yoke and specimen, and magnetizing yoke and sensing yoke were fixed 3 mm and 8 mm respectively. Fig. 2 shows the constructed yoke system. MSE measurement for the biowave-steel frequency ranging from 10 Hz to 10 kHz for different specimen size is shown in Fig. 3. We can see that MSE depends on the specimen size. When frequency is low, specimen size of 8 mm × 8 mm enough, but higher frequency we need specimen size of 140 mm × 140 mm, because of enough large specimen size for eddy current loop generation.

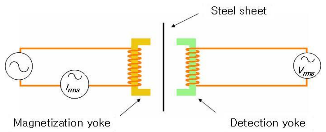

Fig. 1. Compose of magnetizing yoke and sensing yoke.

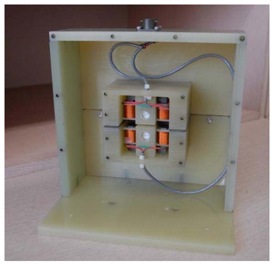

Fig. 2. The construckted yoke system.

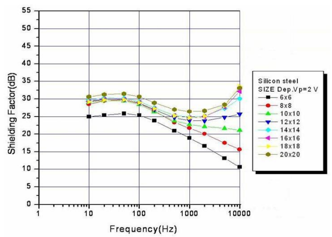

Fig. 3. MSE measurement for the bio sttel frequency ranging from 10 Hz to 10 kHz.

REFERENCES

[1] J.L. Norman Violette, D.R.J. White, and M. F Violette, Electromagnetic Compatibility Handbook, Van Nostrand Reinhold Co. 1987.
[2] K. Fitzgerald, "Electromagnetic fields: the jury's still out", IEEE spectrum Agust, pp. 22-35(1990).
[3] ASTM A698M-92.

AQ09

Inductive Magnetofludic Sensor for Volume and Density Measurement

Stanci Aurora* and Stanci Andreea

University of Petrosani, 20 University Street, 332006 Petrosani, Romania

*Corresponding author: e-mail: auradu@xnet.ro

The volume of a heavy body characterized by a random shape of its surface is usually measured by using a method based on the liquid dislocated. The picnometer is a sensor based on this method. If we will use as a liquid to be dislocated a magnetic fluid will obtain a magnetofluidic sensor for volume measurement [1,2]. The physical principles of the sensor shown in this paper are based on communicating vessels principle and on dislocated volume by a solid body in a fluid medium. The non-miscible liquids used in this work are, water inside of working chamber and magnetic fluid based on petroleum inside of the coil.

The inductive magnetofluidic sensor shown in figure 1 consists of a working chamber 1 half full with water 2 which communicates with a cylindrical nonmagnetic vessel 3 surrounded by a coil 4. Magnetic fluid (5) based on petroleum non-miscible with water (2) is in equilibrium. In the case shown in figure 1 is achieved condition and magnetic fluid densities is bigger water densities, $\rho_{MF}>\rho_W$. The volume of a heavy body characterized by a random shape of its surface, of whom volume have to be measured will be immersed in water positioned in working chamber so that the level of the water and of the magnetic fluid will be changed. From theoretical and experimental data be optained a linear relation between volume of the body and variation of coil inductance.

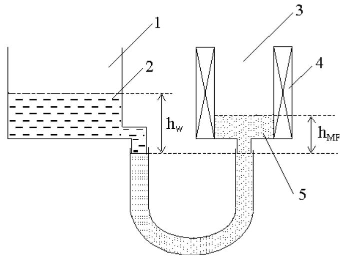

Fig. 1. Inductive magnetofluidic sensor.

REFERENCES

[1] A. Stanci *et al.*, Sensors and Actuators: A Physical − Journal number 6033 (2000).
[2] A. Stanci *et al.*, ICMF9, Bremen, Germany, pg. 243, (2001).