ABSTRACT

In industrial production there needs to be an identification process which includes the inspection and quality control stages to maintain the condition and quality of the product due to the production system. The identification carried out to detect and evaluate the inhomogeneity or anomalies in product that are not visible from outside the product with NDT method. One indicator of the existence of anomalies is the inhomogeneity of the physical parameters of the test object. One of the identification process can be done by the identification of physical parameters through tomography method. The most widely developed method of tomography is the EIT method.

The EIT method applies constant electric current injection to the boundary plane of the test object cause less sensitive to changes in the resistivity distribution in the middle of the test object so the excitation energy of magnetic field induction is required. The method of induction of magnetic field required a considerable magnetic field. As known the EIT method is relatively secure, so the magnetic induction system uses non-ferromagnetic materials. The magnetic field induction in the EIT method is known as ICEIT method. By using the ICEIT method, it is expected that the excitation energy can reach the surface of the test object far from boundary plane so can solve ill-possed problem on the electric current injection in the EIT method known as ACEIT method. However, an important issue in the ICEIT method is the inhomogeneous homogeneity of the inductor magnetic field. Therefore, it is necessary to appropriate the use of physical parameters of the magnetic field induction system, ie by varying the excitation frequency, excitation electric current, the amount of inductor coil winding, induction distance, induction number, inductive coil position configuration pattern, inductive coil form, test object shape, location of potential electrode, potential measurement method, and reconstruction method.

Based on experimental results of magnetic of ICEI magnetic induction system shows that determination of physical parameters can produce measurable boundary potential measurement data with multimeter device that available at Telkom University NDT research laboratory. The validation of the measurement data is done by comparison with the simulation result. This is evidenced by the comparison of plot result data. The best plot of the data is determined by the physical parameters of the magnetic induction system as follows, frequency f = 10 KHz, electrical current source I_0 = 3,7 mA_{pp}, and the amount of inductor coil winding N = 600 turns. The data accuracy level (error) on the homogeneous test object is 3,61 % and anomaly is 4,41 %. Based on the comparison of the simulation data with the boundary measurement data, the accuracy (error) $\leq$ 10 % is obtained, so the potential boundary data of the experimental result can be done for the reconstruction of the tomography image for the identification process.

Keyword : identification, homogeneous, anomaly, physical parameters, ICEIT method, boundary potential.