

Panya Phasingsri 2012: The Study and Design of Non-destructive Testing Based on Eddy Current. Master of Science (Metrology), Major Field: Metrology, Department of Physics. Thesis Advisor: Assistant Professor Pongsakorn Juntarut, Ph.D. 78 pages.

In this study, presented the study and design of non-destructive testing based on eddy current. Attention has been focused on the low-cost tool for detecting a crack or flaw on the surface of conducting material. This instrument system consists of 3 parts: a probe, a notebook with soundcard, the phase detector circuit and program for system adjusting and monitoring. The probe was fabricated by winding 900 turn of 40 AWG copper wires around a ferrite core. The instrument system was controlled by a LabVIEW program. The sine wave with frequency of 10 kHz-20 kHz and amplitude of 1 V<sub>p-p</sub> from line-out of sound card was supplied to the probe. The variation of phase and voltage across the probe based on AC Three Voltage of Theory was detected by line-in of the sound card. The phase angle dependency on the flaw depth is linear and can be fitted with linear function. The obtained transfer function used to convert the voltage measuring to depth of flaw in real measurement by using LabVIEW program. The performance of the eddy current probe system was tested by detecting crack of reference aluminum sheet at different depths from the surface (Serial Number 2.165-551 Code 2941) and reported uncertainty of measurement at confident level 95%. The maximum error of 0.2 mm with uncertainty of  $\pm 0.01$  mm was determined from measuring 0.2 mm depth flaws.

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Thesis Advisor's signature