Evaluation of back-side slits with sub-millimeter resolution using a differential AMR probe

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ABSTRACT

The electromagnetic method of the Non-destructive Test is one of the approaches in the field of crack detection on a metallic sample. One of the techniques that appear in the electromagnetic method is the Eddy Current Testing (ECT), where it utilizes the electromagnetic principle to detect cracks in metallic components. In this research, an ECT probe that is made up of two AMR sensors, two excitation coils, and a developed set/reset circuit. Besides, a digital lock-in amplifier has also been developed by using NI-LabVIEW and a data acquisition (DAQ) card. A measurement system that incorporates the ECT probe and the digital lock-in amplifier as well as an amplifier circuit, a power supply, a PC and an XY stage to which the probe is attached to, is developed. Then, artificial slits with different depths from 768 µm to 929 µm are created on a galvanized steel plate sample. The slits are evaluated from the back-side of the galvanized steel plate via two types of scanning, which is the line scan and full map scanning. From the results of the line scan, the localization of the slits, as well as their depths, could be performed and estimated. Furthermore, 2-D mapping of the sample from the backside has been generated. The 2-D map shows that the position of the slits could be estimated, including their slits depths.

KEYWORDS

AMR; Anisotropic magnetoresistance; ECT; Eddy Current Testing; NDT; Non-destructive testing

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