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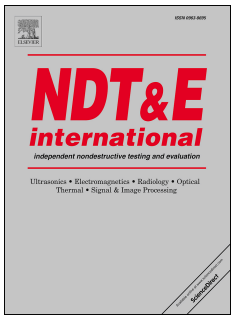

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Non-destructive evaluation of ferromagnetic material thickness using Pulsed Eddy Current sensor detector coil voltage decay rate

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Abstract

A ferromagnetic material thickness quantification method based on the decay rate of the Pulsed Eddy Current sensor detector coil voltage is proposed. An expression for the decay rate is derived and the relationship between the decay rate and material thickness is established. Pipe wall thickness estimation is done with a developed circular sensor incorporating the proposed method, and results are evaluated through destructive testing. The decay rate feature has a unique attribute of being lowly dependent on properties such as sensor shape and size, and lift-off, enabling the method to be usable with any detector coil-based sensor. A case study on using the proposed method with a commercial sensor is also presented to demonstrate its versatility.

Keywords: detector coil, ferromagnetic, finite element analysis, NDE, NDT, Pulsed Eddy Current, pipe, sensor

1. Introduction

Pulsed Eddy Current (PEC) sensing is considered as a more versatile member of the family of Eddy Current (EC) Non-destructive Evaluation (NDE) techniques [1]. Since EC inspection techniques are severely affected by the skin

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