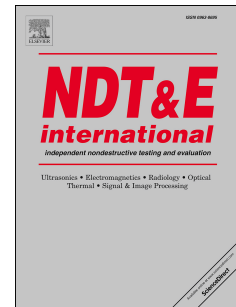


# Accepted Manuscript

Development of omnidirectional  $A_0$  mode EMAT employing a concentric permanent magnet pairs with opposite polarity for plate inspection

Zenghua Liu, Yanan Hu, Muwen Xie, Bin Wu, Cunfu He



PII: S0963-8695(17)30391-2

DOI: [10.1016/j.ndteint.2017.11.001](https://doi.org/10.1016/j.ndteint.2017.11.001)

Reference: JNDT 1930

To appear in: *NDT and E International*

Received Date: 25 June 2017

Revised Date: 16 October 2017

Accepted Date: 3 November 2017

Please cite this article as: Liu Z, Hu Y, Xie M, Wu B, He C, Development of omnidirectional  $A_0$  mode EMAT employing a concentric permanent magnet pairs with opposite polarity for plate inspection, *NDT and E International* (2017), doi: 10.1016/j.ndteint.2017.11.001.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Development of omnidirectional $A_0$ mode EMAT employing a concentric permanent magnet pairs with opposite polarity for plate inspection

\*Zenghua Liu, Yanan Hu, Muwen Xie, Bin Wu, Cunfu He

College of Mechanical Engineering and Applied Electronics Technology, Beijing University of Technology,  
Beijing, 100124, China

\*Corresponding author: e-mail: liuzenghua@bjut.edu.cn

## Abstract

This work presents an omnidirectional electromagnetic acoustic transducer (EMAT) for generating and receiving  $A_0$  mode of Lamb waves in plate structures. The proposed EMAT is composed of a spiral meander coil (SMC) and a new concentric permanent magnet pairs with opposite polarity (CPMP-OP) for enhancing the generation and detection of  $A_0$  mode. A finite element model was established to simulate the directions of the static magnetic field produced by the permanent magnets and the incentive process of guided waves. To verify the performance of the EMAT, several experiments were performed. Firstly, we experimentally verified that the developed EMAT could generate and receive a pure single  $A_0$  mode omnidirectionally. Then, the relationship between the frequency response characteristic of the developed EMAT and the interval  $l$  (the distance between the two adjacent annular wires of the SMC) were explored. Furthermore, the circumferential consistency of the transducer was well demonstrated. Finally, the sensing performance of the developed omnidirectional  $A_0$  mode EMAT employing a CPMP-OP was compared with that of EMAT with different structures of coils and permanent magnets. The experimental results indicated that the developed omnidirectional  $A_0$  mode EMAT employing a CPMP-OP could enhance the signals of the  $A_0$  mode.

**Keywords:** Lamb waves; EMAT, Plate; Permanent magnet; Omnidirectional; defect detection

## 1. Introduction

As a special ultrasonic propagation in the waveguide structure, ultrasonic guided waves are widely applied

Download English Version:

<https://daneshyari.com/en/article/6758282>

Download Persian Version:

<https://daneshyari.com/article/6758282>

[Daneshyari.com](https://daneshyari.com)