

A SYSTEM AND A METHOD FOR DETECTING AND CHARACTERIZING A DEFECT IN AN OBJECT USING GUIDED WAVE INSPECTION

IITM Technology Available for Licensing

Problem Statement

- Guided wave inspection methods in non-destructive evaluation often encounter challenges due to the existence of multiple wave modes at a single frequency, complicating analysis.
- Mode conversions and dispersive effects further complicate the inspection process, making it difficult to excite a single wave mode selectively.
- Current popular methods, such as comb transduction, offer selective excitation of single wave modes** but rely on complex and expensive mechanical movement systems to change the wavelength of excitation.
- There is a need for **an electronically controlled wavelength changing system** that can be integrated into existing phased array equipment.

Intellectual Property

- IITM IDF Ref. 2117
- IN 202141025996
- PCT/IN2022/050464

Technology Category/ Market

Category - Non-Destructive Testing (NDT) and Inspection.

Applications - NDE and structural health monitoring in oil refineries or coal mining.

Industry - Corrosion Monitoring and NDT

Market - Global NDT and Inspection market size is projected to reach USD 18.5 billion by 2028, at a **CAGR of 10.1%**.

TRL (Technology Readiness Level)

TRL - 4 , Technology validated in lab scale.

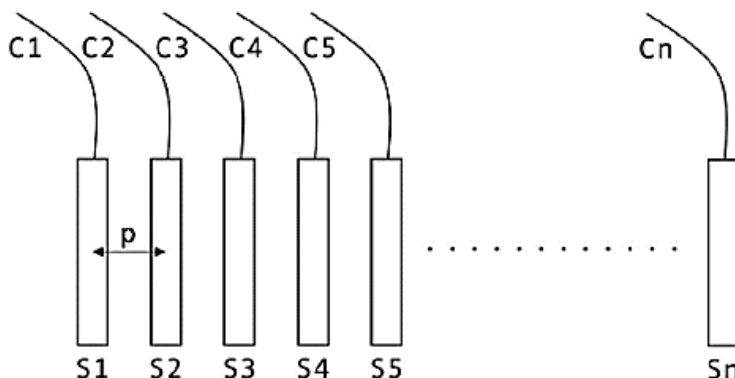


FIG. 1. Shows an exemplary arrangement of source elements in a comb-like pattern transducer.

Technology

- The technology involves a method for detecting and characterizing defects in objects using comb-like pattern transducers that generate guided waves based on specific wavelengths and analyze the waves using a 2D-FFT technique to determine cut-off frequencies and remnant thickness values.

- These comb-like pattern transducers consist of arrays of source elements, which can be controlled individually or in groups, and may include piezoelectric materials, Lorentz force EMAT elements, or magnetostrictive strip elements for wave generation.

- The generated guided waves can be of various types, including Zero Group Velocity (ZGV) and Negative Group Velocity (NGV) wave modes, and may use single, multiple, or broadband wavelengths, enabling flexibility in the inspection process.

Research Lab

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Key Features / Value Proposition

- Enhanced Inspection Accuracy**
 - The technology provides a more precise and reliable method for defect detection and characterization, improving the overall quality of non-destructive evaluations.
- Versatile Wave Generation**
 - It enables the selective generation of different guided wave modes and a wide range of wavelengths
- Non-Destructive Testing Advancements**
 - The 2D-FFT analysis technique enhances the ability to analyze guided waves, allowing for more comprehensive frequency-wavenumber and frequency-wavelength domain analyses.
- Integrated System**
 - The system's integration with phased array equipment simplifies the inspection process, making it accessible and convenient for a broad range of industrial applications.

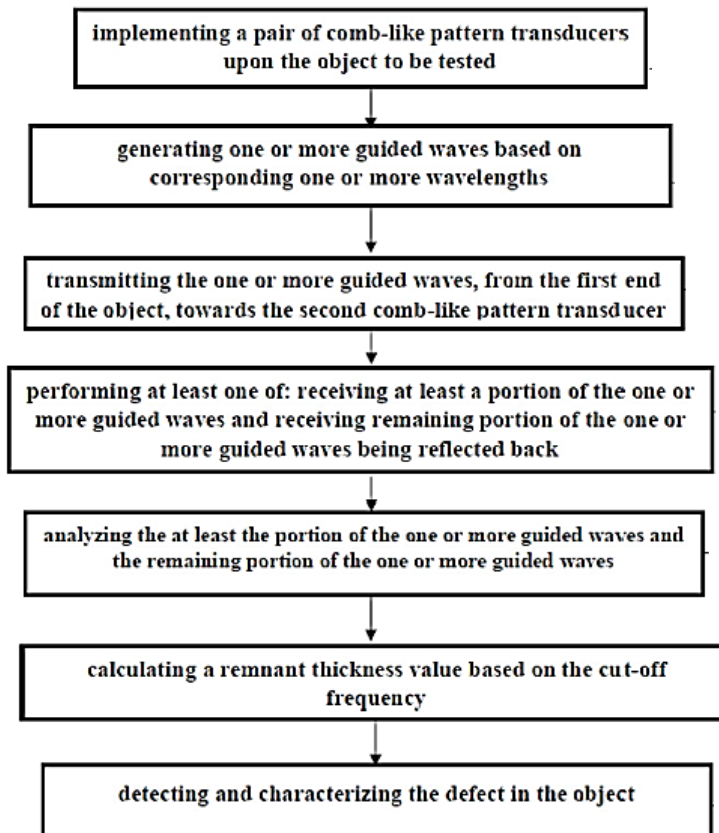


FIG. 2. Shows a flowchart disclosing method of detecting and characterizing a defect in an object.

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