

(158)

Generation of Axial Pipe HOMC Using Comb Transduction

Sri Harsha Reddy K¹, Prabhu Rajagopal¹, Krishnan Balasubramaniam¹, Samuel Hill² and Steve Dixon², ¹Centre for Nondestructive Evaluation, IIT Madras, Chennai – 600036 and ²Department of Physics, University of Warwick, United Kingdom

Guided wave non-destructive evaluation (NDE) is the most widely used technique to perform long range inspection. Higher Order Modes Cluster (HOMC), discovered at the author's research group [1] consist of multiple higher order guided wave modes that travel together as a cluster and without any appreciable dispersion for distances in the range of meters. These waves not only propagate along the length of the structure but also cover the entire thickness and circumference, and in view of the higher frequencies, they can offer improved resolution over conventional low-frequency guided waves. This paper introduces a novel approach for generation of a new type of HOMC, namely axial pipe HOMC, using comb transduction [2]. Generation of these wave-modes is simulated using Finite Element models. Sensitivity of axial pipe HOMC is evaluated by calculating reflection co-efficient from canonical defects. Advantages and limitations for practical realization of the above approach have also been discussed.

References:

1. Chandrasekaran, J., Krishnamurthy C.V., Balasubramaniam K., Higher Order Modes Cluster Guided Waves - A New Technique for NDT Inspection, Review of Progress in Quantitative Nondestructive Evaluation July 2008 (American Institute of Physics) AIP Conf. Proc. Vol. 28A,121-128 (2009).
2. Rose, J.L., Pelts, S.P., Quarry, M.J., A Comb transducer model for guided wave NDE, Ultrasonics, Vol. 36, 163-169 (1998).