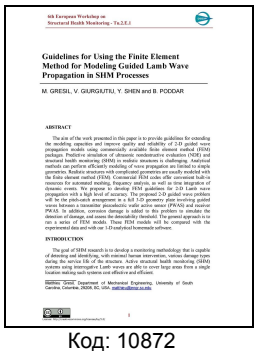

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Guidelines for Using the Finite Element Method for Modeling Guided Lamb Wave Propagation in SHM Processes

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The aim of the work presented in this paper is to provide guidelines for extending the modeling capacities and improve quality and reliability of 2-D guided wave propagation models using commercially available finite element method (FEM) packages. Predictive simulation of ultrasonic nondestructive evaluation (NDE) and structural health monitoring (SHM) in realistic structures is challenging. Analytical methods can perform efficiently modeling of wave propagation are limited to simple geometries. Realistic structures with complicated geometries are usually modeled with the finite element method (FEM). Commercial FEM codes offer convenient built-in resources for automated meshing, frequency analysis, as well as time integration of dynamic events. We propose to develop FEM guidelines for 2-D Lamb wave propagation with a high level of accuracy. The proposed 2-D guided wave problem will be the pitch-catch arrangement in a full 3-D geometry plate involving guided waves between a transmitter piezoelectric wafer active sensor (PWAS) and receiver PWAS. In addition, corrosion damage is added to this problem to simulate the detection of damage, and assess the detectability threshold. The general approach is to run a series of FEM models. These FEM models will be compared with the experimental data and with our 1-D analytical homemade software.

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Ключевые слова:

Содержание