

2016

Measurement of thickness of thin metal sheets by the A_0 Lamb mode at low frequency.thickness products

S. SAIT, F. Boubenider

Abstract : Industrial structures undergo significant stresses during their life and can destroy the environment. This can, in many cases, cause serious damage, often imperceptible. Several methods are used to detect and locate such early stage damage. Lamb waves, which are guided by both surfaces of a planar structure, are good candidates to inspect the plate in a non invasive manner. These waves have the advantage to travel long distances without significant attenuation in the direction of propagation, which allows control quickly, permanently and in real time, large areas of difficult access. In this work, we present a method to measure the thickness of thin sheets using the propagation of the first anti-symmetric A_0 Lamb mode, generated by a piezoelectric transducer. The principle is based on the existing proportionality relationship between the group velocity and thickness of thin metal sheets, at low frequencies. We test this relation on various metallic sheets of thicknesses: 25; 75; 100; 160 and 200 microns.

Keywords : Lamb waves, group velocity, thickness, Transducer.