RECONSTRUCTING ULTRASONIC IMAGES AND FLAW DETECTION IN TIME−FREQUENCY DOMAIN BY MATCHING A−SCAN INSPECTIONS (MonPmOR9)

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Abstract :

Time−frequency techniques are applied for mixing signals from a material inspected by a multiple sensor detection system. Ultrasonic sensors are located at the perimeter of a rectangular shaped material evaluated in a pulse−echo scheme. The resulting mixed signal becomes a high−resolution time−frequency image of the material. Different kinds of classification techniques can be applied to this image in order to obtain the defects in the material. In this paper, a simulation and experimental evaluation of the proposed approach are presented. Several time−frequency transforms and the fuzzy c−means are used. In the simulations, backscattering of the material grain is modelled by using Gaussian and K distributions with different signal to noise ratio parameters. The validity of the presented method is assessed through the detection and spatial location of artificial defects in a material with a rectangular shape. The performance of the classification technique in discerning defects buried in the backscattering from the material grain microstructure, is also discussed.

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