

1.3.46. NEW COMPUTER AIDED MATERIAL MICROSTRUCTURE CHARACTERIZATION METHOD FOR ULTRASONIC NDT

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Detection of internal defects in various structures with ultrasound NDT method is widely used for industrial components. Ultrasonic data are difficult to interpret since they require the analysis of a continuous signal. Presence of the additive structural noise from grain boundaries and other microstructures limit detection of small defects. Various denoising methods are useful, if this noise is described as a zero-mean Gaussian white noise. But if it is time invariant and slightly correlated with a signal with a frequency band very similar to the defect echoes, classical methods may not very helpful.

In this paper we present a new denoising method with exploration of the structural noise features. This method performs a noise features extraction that avoids the noise random nature. Yet if anisotropic noise is related to local variations in texture or shapes of macro notch, the relationship of this ultrasonic property to microstructure is not well understood, and no careful theory has been presented to quantitatively describe these relationships.

The following experiments obtained from a structural noise of a steel plate, will give significant insights into the relationship of backscattered noise and microstructure which will ensue to understand the microstructure dimension scales. These experiments denote the well established filtering method developed in this work, and will give a framework to the investigation of material microstructure features.