De-noising of ToFD Signals from Austenitic Stainless Steel Welds using Stationary Wavelet Transform

Abstract

Inspection of structural materials is an important aspect in many industrial applications. Ultrasonic Non-Destructive Testing (NDT) is one of the most widely used techniques in this aspect. Conventional pulse echo and through transmission methods in Ultrasonic Testing (UT) are not reliable in detection of defects with random orientation due to its reflection principle. Time of Flight Diffraction (ToFD) method has gained more popularity in this area in the recent past. It uses diffraction energy and has more advantages in detection, sizing and positioning of the defects irrespective of type, orientation and characteristics. This technique is hampered by several of the unwanted signals arising due to ultrasonic interaction with the material grains. This noise affects the visibility of a defect signal especially when the defect size is small. Many signal processing techniques such as split spectrum processing, wavelet transform and correlation etc are available for de-noising of signals. Among this Discrete Wavelet Transform (DWT) is widely used due to its added advantage of time-frequency information simultaneously. Stationary Wavelet Transform (SWT) is a form of DWT with the main difference that it is translation invariant unlike DWT. In this paper SWT has been used for de-noising of the real time ultrasonic ToFD signals from austenitic stainless steel welds and its performance is
compared with that of the DWT.

References

- Ogilvy J. A. and Temple J. A. G., ‘Diffraction of elastic waves by cracks:

Index Terms

Computer Science

Signal Processing

Keywords

Stationary Wavelet Transform, Discrete Wavelet Transform, De-noising, Signal-to-Noise ratio
De-noising of ToFD Signals from Austenitic Stainless Steel Welds using Stationary Wavelet Transform