

Location of material flaws using Split Spectrum Processing and wavelet transform

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Abstract : The Non Destructive Testing by ultrasounds is based on the detection and the interpretation of ultrasonic wave reflected by material flaws. Various signal processing techniques were introduced. They are based on frequential analysis in order to increase the defects detection and to improve their localization. It is quite allowed today that the signal representations, jointly in time and frequency, are of interest. They give a natural description of the nonstationary signals whose frequency varies in time or comes from transient states. In this work, we develop echoes detection technique drowned in material structural noise which can induce in error, the controller experts in the results interpretation. So, we show that the application of algorithms based on Split Spectrum Processing (SSP) and the Discrete Wavelet transform (DWT), can increase detection possibilities. A comparative study is carried out between SSP with Q constant and DWT in particular Symlets wavelets, Daubechies wavelets and Coiflets wavelets with several orders associated to some thresholding algorithms. All these methods are developed and applied to ultrasonic signals with additional modelled structure noise. The simulation results are validated by experimental results obtained on steel material.

Keywords : Denoising, Discrete wavelet transform, Signal processing, Ultrasonic