

Application of signal processing techniques to ultrasonic guided waves

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Abstract : Ultrasonic guided wave testing is an attractive alternative for large-area inspection since it offers the potential for rapid screening from a single transducer position and remote inspection of physically inaccessible areas of the structure. Compared to bulk waves, guided waves exist only in waveguides, such as plates and pipes, in which they continually interact with the boundaries of the material. Therefore they are confined and allowed to propagate over long distance. However, guided wave inspection is complex because there are many modes in plates and pipes and they are in general dispersive (their velocity is a function of frequency). In this work, the objective is to improve the time resolution and signal-to-noise ratio of signals obtained from inspection of plates by the A0 and S0 mode. The signal processing scheme used is based on deconvolution of the measured signal by matching pursuit signal decomposition. The deconvolution technique is applied to simulated signals from plates with various types of notch discontinuities. Using this technique, the separation distance between adjacent notches was estimated with high accuracy

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