

Deconvolution of ultrasonic echoes using bernoulli-gaussian processes for composite materials inspection

Abdessalem BENAMMAR, Redouane DRAI, Ahmed KECHIDA, Abderrezak GUESSOUM

Abstract : In this work, we present an approach of deconvolution ill-posed problems of superimposed signals in time. A priori information must be taken into account to solve this problem. The a priori information translates the physical properties of the ultrasonic signals. The defect impulse response is modelled as a Bernoulli-Gaussian sequence. Deconvolution becomes the problem of detection of the optimal Bernoulli sequence and estimation of the associated complex amplitudes. We initially apply this method in order to simulate signals with additional structural noise. These signals contain several echo defects, closer between them. This stage permits to evaluate the robustness of the developed algorithm. Thereafter, we validate all simulated results by experimental results obtained on composite material with and without delamination defects.

Keywords : Ultrasonic NDE, composite materials, blind deconvolution, processes BG