07WA101 On the Use of Complex Excitation Sequences for Eddy Current Testing

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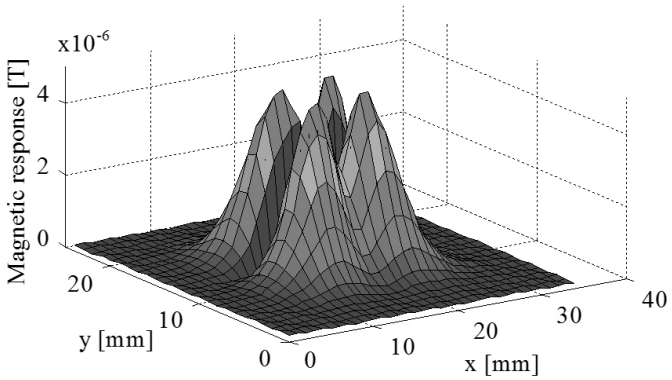
Eddy Current Testing (ECT) are widely used in many industrial application fields where is very important to detect the presence of thin defects (cracks) in conductive materials and to characterize their geometrical characteristics. The analysis of these characteristics allows the user accepting or discarding realized components and improving the production chain. In the measurement process the choice of signal type, frequency and amplitude to be adopted in the excitation stage is a critical issue to be accomplished for.
In different application fields, the actual research on ECT is considering excitation signals different to the sinusoidal ones. In this paper the authors propose an experimental comparison of different excitation signal designed to improve the quality of experimental data when difficult cases are experienced (such as sub-superficial deep cracks) and consequently to obtain a more reliable extraction of defects geometrical features.



Example of the obtained map related to a superficial defect considering the 5 kHz tone of the multi-sine output signal.

07WA111 The analysis of exponential signals by maximum likelihood estimation

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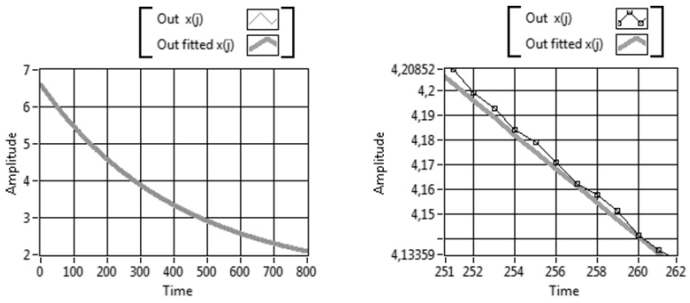
A new method to determine the exponential components of a signal using the maximum likelihood method will be presented in this paper. The exponential stimulus signal is assumed to be distorted by superimposed exponential components with longer time constant and smaller peak value. The exponential signal to be identified is acquired by a general purpose ADQ board. The advantage of the proposed method is lower sensitivity to the additive noise and restriction of the signal processed to the full scale range of the ADC. The sensitivity of the proposed method on the initial condition and on the number of samples is studied theoretically and by simulation.



Estimation results based on the ML method for multiexponential signal with and without superimposed noise