

1.3.15. APPLICATION AND SIMULATION OF ADVANCED ULTRASONIC ARRAY TECHNIQUES

Le Ber L., Roy O., M2M, 1, rue de Terre Neuve, Les Ulis, France;
Reverdy F., Mahaut S., CEA, LIST, Gif-sur-Yvette, France

Inspection techniques using ultrasonic phased-arrays are now commonly carried out by industry. They present the advantage of rapidity and flexibility. Their adaptability enables to transmit focused beams in the region of interest of the inspected part by applying suitable electronic delays at transmission and summation processing at reception.

In parallel to these industrial implementations, new technical solutions which massively exploit simulation capabilities have emerged. Simulation is used at various steps of the inspection: Conception of the inspection and design of the array; computation of suitable delay laws with a possible consideration of geometrical and materials complexity; performance demonstration and calculation of POD (probability of detection). Also, new acquisitions techniques based on simulation have emerged which involve more advanced processing of elementary signals (DDF, parallel reconstructions, application of matrix array, Full Matrix Capture, autofocus...). These techniques implemented on acquisition systems are proposed to enhance detection and imaging capabilities and exploit the modelling of the ultrasound propagation.

In this communication we present and discuss advanced application of phased-arrays. We emphasize on simulation capabilities and give examples of industrial applications.