

CFA '18 LE HAVRE ■ 23-27 avril 2018
14^{ème} Congrès Français d'Acoustique



**Amplitude Modulation Imaging for detection and characterization of
an embedded crack**

E. Carcreff^a, S. Hauptert^b, G. Renaud^b et Y. Ohara^c

^aDB SAS, 9 rue du Marché Commun, 44300 Nantes, France

^bLaboratoire d'Imagerie Biomédicale, UPMC, 15 rue de l'école de médecine, 75006 Paris, France

^cDepartment of Materials Processing, Graduate School of Engineer, Aramaki-aza, Aoba-ku, 980-8579
Sendai, Japon

ewen_carcreff@db-sas.com

An ultrasonic technique for imaging nonlinear scatterers, such as cracks, buried in a medium has been recently proposed. The method called amplitude modulation imaging (AMI) consists of a sequence of three acquisitions for each line of the image. It has been implemented with conventional phased array transducers. The first acquisition is obtained by transmitting with all elements of the phased array while the second and third acquisitions are obtained by transmitting with odd elements only and even elements only, respectively. An image revealing nonlinear scattering in the medium is reconstructed line by line by subtracting the responses measured with second and third acquisitions (odd elements and even elements) from the response obtained with all elements transmitting. AMI was shown to provide higher detection specificity of the crack than conventional ultrasound imaging. The goal of this study is to better understand the capabilities and limitations of AMI by determining its resolution, its sensitivity and robustness compared to conventional ultrasound imaging for two different metallic samples with partially closed crack.